

Chapter Two

Determinants of Health

2.1 Environment

For the purpose of this publication, environment is defined as all those matters related to health that are external to the human body and over which the individual has little or no control. The environment consists of two parts: (1) the physical environment, and (2) the social environment.

According to Healthy People 2010, physical environment and social environment are:

Physical environment can be thought of as that which can be seen, touched, heard, smelled, and tasted. However, the physical environment also contains less tangible elements, such as radiation and ozone. The physical environment can harm individual and community health, especially when individuals and communities are exposed to toxic substances; irritants; infectious agents; and physical hazards in homes, schools, and worksites. The physical environment also can promote good health, for example, by providing clean and safe places for people to work, exercise, and play.¹

Social environment includes interactions with family, friends, coworkers, and others in the community. It also encompasses social institutions, such as law enforcement, the workplace, places of worship, and schools. Housing, public transportation, and the presence or absence of violence in the community are among other components of the social environment. The social environment has a profound effect on individual health, as well as on the health of the larger community, and is unique because of cultural customs; language; and personal, religious, or spiritual beliefs. At the same time, individuals and their behaviors contribute to the quality of the social environment.¹

Because of the importance of the health care system as a health determinant, we have considered it as a separate entity from the environment in this publication. The health care system consists of the quantity, quality, arrangement, nature, and relationship of people and resources in the provision of health care. The health care system will be discussed in Section 2.3.

Reference:

1. U.S. Department of Health and Human Services. *Healthy People 2010 (Conference Edition, in Two Volumes)*. Washington, D.C.: January 2000.

2.1.1 Social Environment

The social environment is increasingly recognized as associated with the overall health of a population. There is a plethora of indicators dealing with the social environment.¹ Among the elements of the social environment that have been linked to health are family structure, the educational system, social networks, social class, work setting, and level of prosperity.² Demographic data serves as a denominator for the calculation of many health related indicators since the structure and dynamics of a population are indispensable to identifying determinants of health.

References:

1. Bernier L, Sauvageau Y, et al. *User's Guide to 40 Community Health Indicators*. Health and Welfare Canada; 1992.
2. Institute of Medicine. *Improving Health in the Community: A Role for Performance Monitoring*. Washington, D.C.: National Academy Press; 1997.

The elements of the social environment linked to health:

- family structure
- education system
- social networks
- social class
- work setting

Related Indicators

- Population distribution by age and gender
- Population density
- Race/ethnic composition of population

2.1.1.1 Population Growth Rate

Background

The population growth rate is an indicator of demographic change in a population. It reflects population shifts resulting from births, deaths, and migrations. By looking at past trends, we can make crude estimates of future changes in our community. This information helps health planners and policy makers adjust health services according to projected growth in the total population or within certain sub-groups.¹

The rate of growth is affected by differential underestimation of the population between censuses and the age structure. Growth is defined as variation, not necessarily an increase, since growth may be negative.

Findings

As shown in Figure 2, Nashville's population increased very rapidly during the 18th and 19th centuries. During the first seven decades of the 20th century Nashville maintained a 21% average growth rate. From 1960-1980, the population growth rate declined from a high of 24.2% to a low of 6.7%. The population in Nashville started to slowly increase during the 1980s and 1990s with a population growth rate of 11.6% between 1990 and 2000.

If we examine the population growth rate at the public health planning district level between 1990 and 2000, planning district 6 (Bellevue) had the highest growth rate (32.8%) while planning district 8 (North Nashville) had the lowest growth rate (-7.4%). Examining the population growth of council districts reveals that council district 31 had the highest growth rate (47.8%) while council district 17 had the lowest growth rate (-12.5%) for the same decade (Data Tables 2 and 3 in Appendix).

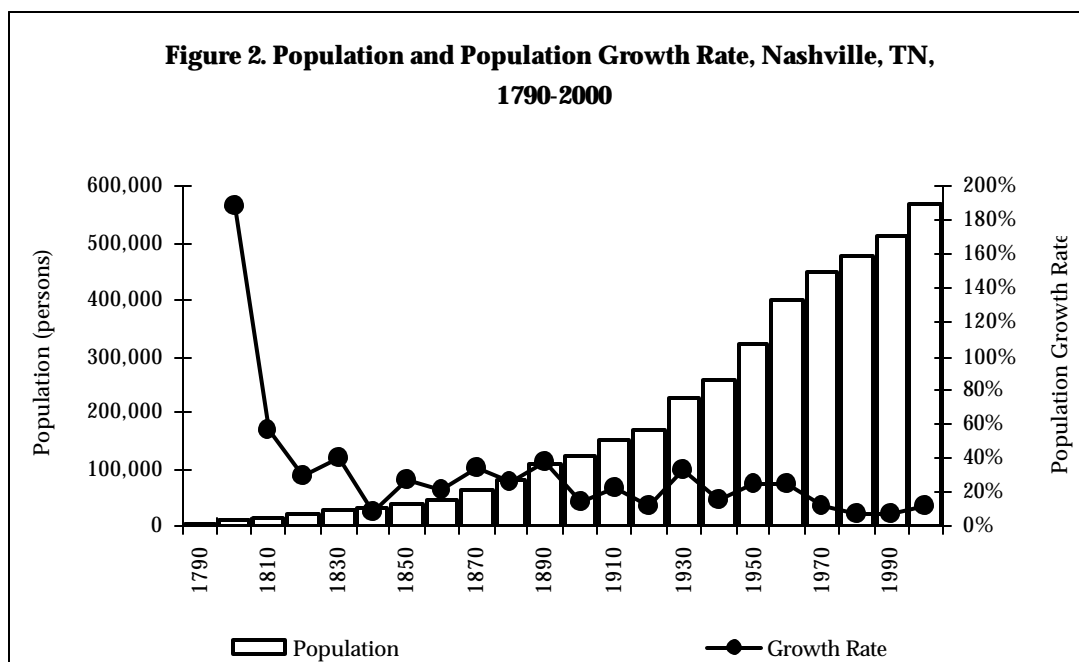
Additional Data

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Data Sources

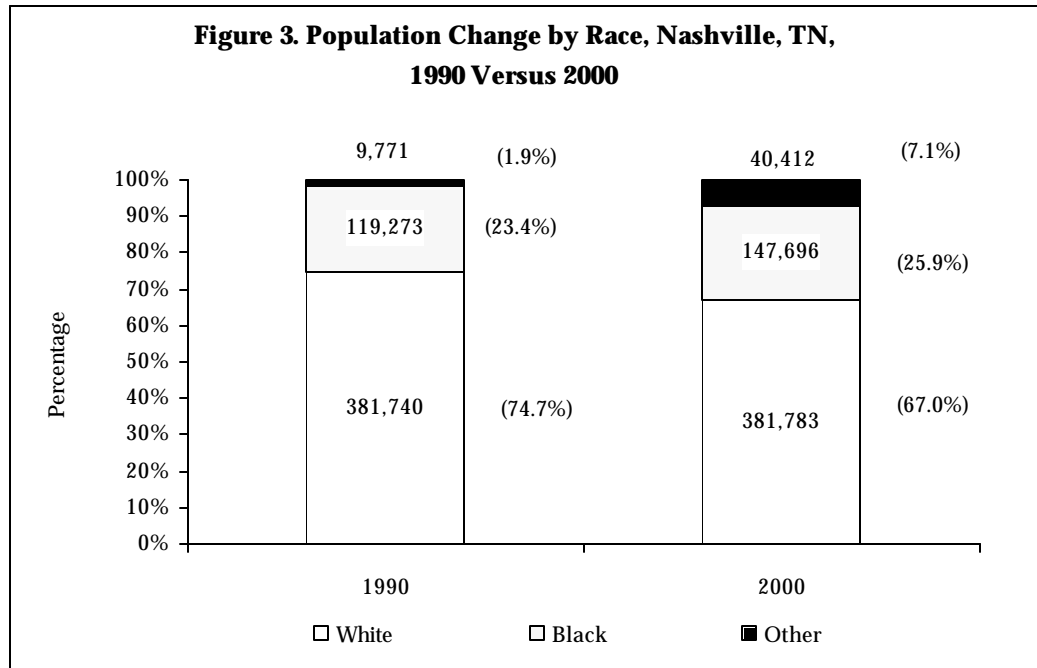
U.S. Bureau of the Census

Figure 2. Population and Population Growth Rate, Nashville, TN, 1790-2000



Nashville's population increased 11.6% from 1990 - 2000.

Figure 3 depicts Nashville's population growth during the last decade. All racial groups increased in size except for whites. The white population remained the same while minority populations increased, resulting in a more diverse population. The percentage of whites in Nashville decreased from 74.7% in 1990 to 67.0% in 2000, whereas, the black population increased from 23.4% in 1990 to 25.9% in 2000. Other races increased from 1.9% in 1990 to 7.1% in 2000, a 270.7% increase. In 2000, Hispanics made up 4.6% of the population, a 440% increase over the last decade. The number of Asian residents doubled to 2.3% (not shown in Figure 3).



With an increase in population comes an accompanying increase in population density. Nashville's population density (See 2.1.1.9 for more information.) increased 11.6% from 1016.9 persons per square mile to 1134.6 persons per square mile between 1990 and 2000.

In comparison with national and state population growth rates, the population in Nashville did not grow as fast as that of Tennessee or the entire U.S. During the last decade, the U.S. population grew 13.2% and the Tennessee population grew 16.7%. Nashville's population, however, increased only 11.6% between 1990 and 2000.

Discussion

The population in Nashville increased 11.6% during the last decade; however, this increase was smaller than increases experienced by many other counties in Tennessee. Furthermore, Nashville's population growth rate is smaller than the growth rates of both Tennessee and the United States.

During 1990 - 2000, all racial groups in Nashville increased in size except for white.

With virtually no change in the number of whites in Nashville and a significant increase in the number of non-whites between 1990 and 2000, the percentage of whites decreased and percentage of non-whites increased. This change highlighted the diversity issue. Health disparities among these groups have become an important public health issue.

Reference:

1. Bernier L, Sauvageau Y, et al. *User's Guide to 40 Community Health Indicators*. Health and Welfare Canada; 1992.

The percentage of white population decrease and the percentage of non-white population increase from 1990 - 2000 highlights the diversity issue in our community.

Related Indicators

- Population growth rate
- Population density
- Race/ethnic composition of population

Additional Data

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2.1.1.2 Population Distribution by Age and Gender

Background

Age and gender are the basic characteristics of a population. These characteristics play a significant role in determining a community's disease spectrum and an individual's health status. Age is one of the most important factors to consider when one is describing the occurrence of health-related events because the risk of many diseases changes with age. Numerous epidemiological studies have shown gender differences in a wide scope of health phenomena. Therefore, both age and gender are essential factors to consider in the health planning process to ensure that adequate health services are provided.¹ The age and gender composition of a population can be presented as a double histogram. This double histogram is called a population pyramid, or age pyramid.

The population pyramid enables one to see the basic characteristics of the population's age and gender distribution. Any imbalances in age composition or gender distribution can easily be seen through the population pyramid. Therefore, the population pyramid is an important tool for illustrating the health portrait of a population.¹

The population pyramid can be used to compare the pyramids of two different populations or a single population at different time periods. When making comparisons, the same age groupings and the same scale should be used because different age groupings will lead to different shapes of the population pyramid. In addition, the population distribution by age and gender should be considered as a descriptor of the state of a population rather than a health indicator per se.²

Findings

Figures 4 and 5 display the age composition and gender distribution of Nashville's population in 1990 and 2000. It is observed that the overall population pyramid exhibits an upward shift. Age groups that show large increases are the 45-49 age group, the 50-54 age group, and the 85+ age group. The increases are 50.0%, 49.1%, and 32.8%, respectively. It is noted that four age groups have a negative growth rate from 1990 to 2000. They are the 65-69 age group (decreased 9.1% from 1990 to 2000), the 30-34 age group (decreased 5.6%), the 60-64 age group (decreased 3.6%), and the 25-29 age group (decreased 1.9%). (See Figure 6 and Data Tables in Appendices.)

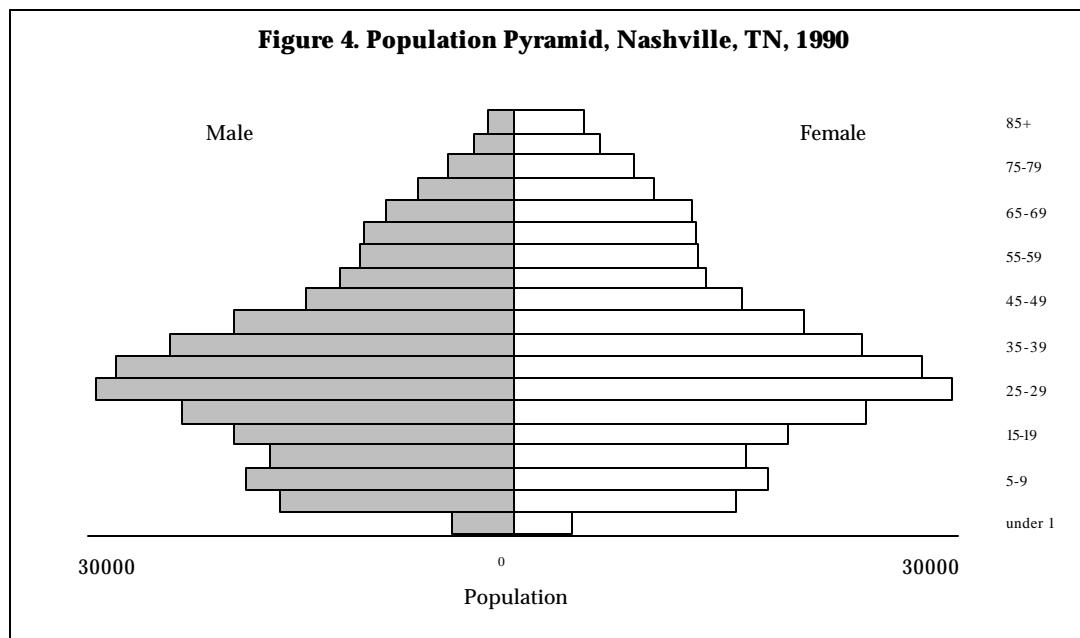
Figure 7 shows that there were more females (51.6%) than males (48.4%) in Nashville in 2000. Additionally, the percentage of females in the population decreased 1.8% from 1990 to 2000.

Discussion

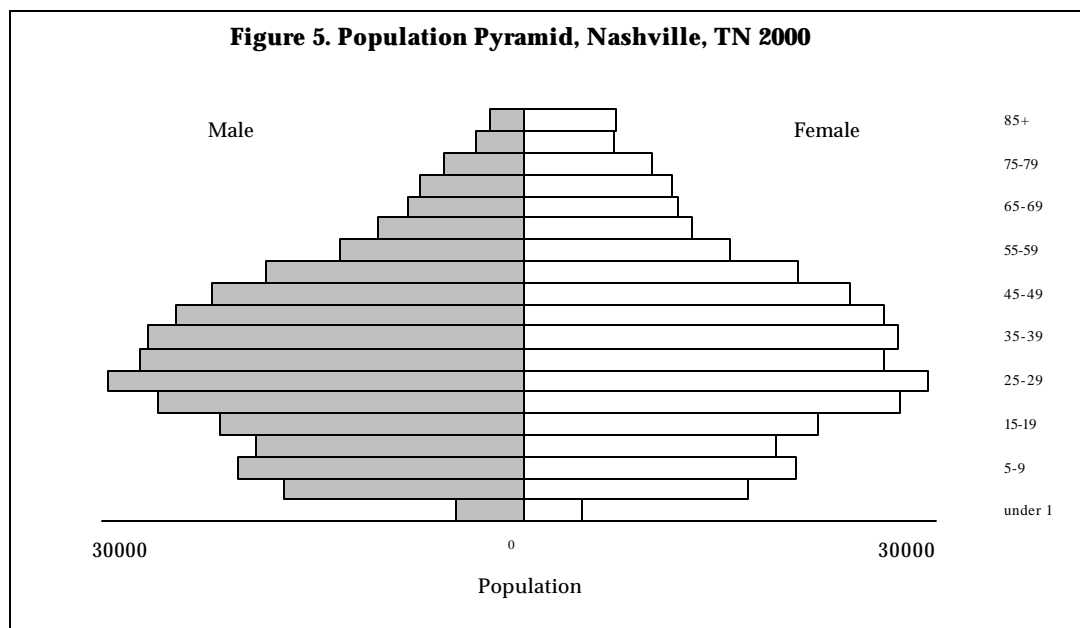
The upward movement of Nashville's population pyramid and the large increases in the age groups 45-49, 50-54, and 85+ presents two new challenges to our community. Nashville's population reflects the aging trend of the nation's population; however, the 45-54 age group and the 85+ age group will have different health needs. The 45-54 age group is often referred to as "middle aged". For some it may be a time of slowing down, planning for retirement, and paying more attention to health. Nashville's population increase in this age group is paralleled nationally as the "baby boomers" begin their second 50 years of life. It is during this time period that cancer becomes a more feared and real threat for an individual. In Nashville, for both genders, increases

Data Sources

U.S. Bureau of the
Census

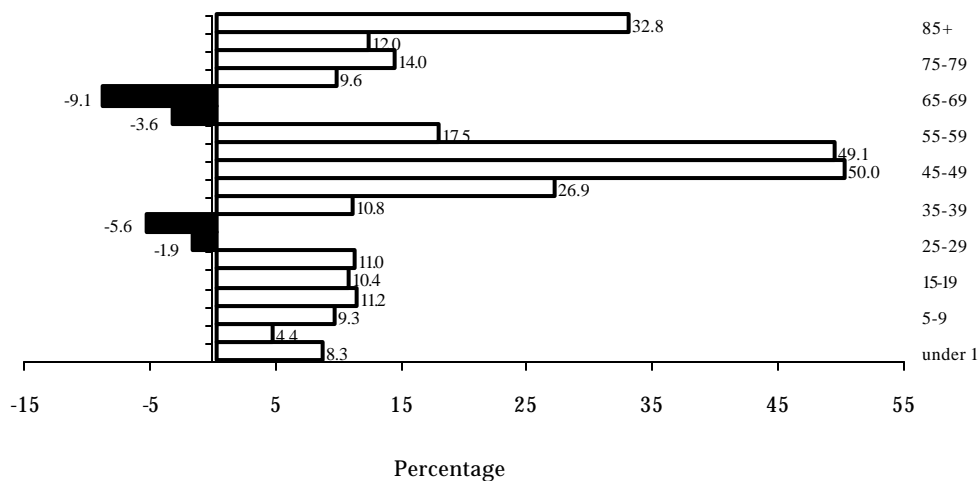
Figure 4. Population Pyramid, Nashville, TN, 1990

The upward movement of Nashville's population pyramid and large increases in the age groups of 45 - 49, 50 - 54, and 85+ present two new challenges to our community.

Figure 5. Population Pyramid, Nashville, TN 2000

in cancer deaths begin in the 35-44 age group and speed up in the 45-54 age group.³ Heart disease and stroke as leading killers become a reality for the 45-54 age group.³ The good news is that the three leading killers for these people aged 45-54 are preventable, wholly or in part, through changes in behavior and lifestyle. For ages 85+, the major challenge will be to ensure a high quality of life during the "golden years". Chronic problems such as arthritis, osteoporosis, incontinence, visual and hearing impairments, and dementia are major concerns because they impair day-to-day living. Adopting a healthy lifestyle and making health services available and accessible to this group should be on the health planner's agenda.

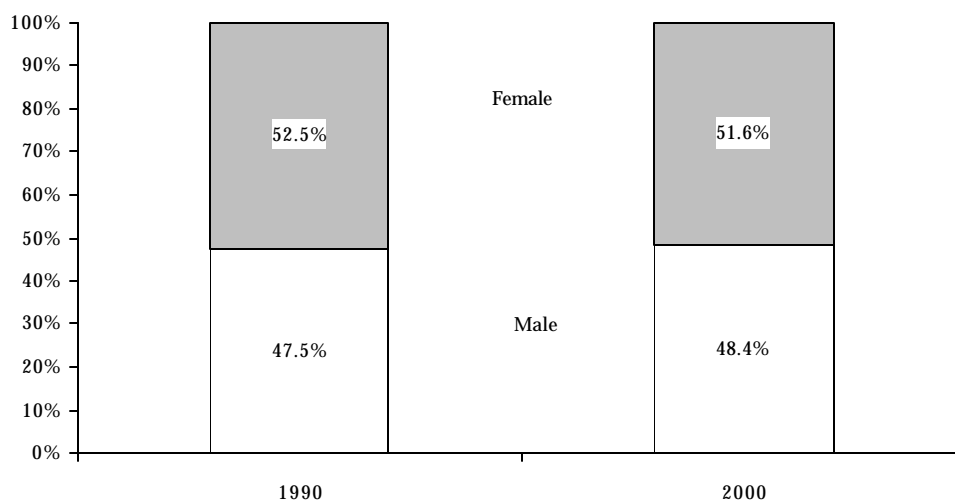
Figure 6. Population Percentage Change by Age Group, Nashville, TN, 1990 and 2000



Four age groups had a negative growth rate from 1990 - 2000:

65 - 69
30 - 34
60 - 64
25 - 29

Figure 7. Population Gender Distribution, Nashville, TN, 1990 and 2000



References:

1. Peron Y, Strohmenger C. *Demographic and Health Indicators*. Statistics Canada; 1985.
2. Bernier L, Sauvageau Y, et al. *User's Guide to 40 Community Health Indicators*. Health and Welfare Canada; 1992.
3. Division of Epidemiology, Metropolitan Public Health Department of Nashville and Davidson County. *1997 Mortality Assessment, Davidson County, TN*. 1999.

Related Indicators

- Population growth rate
- Population density
- Population distribution by age and gender

Additional Data

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2.1.1.3 Race/Ethnic Composition of Population

Background

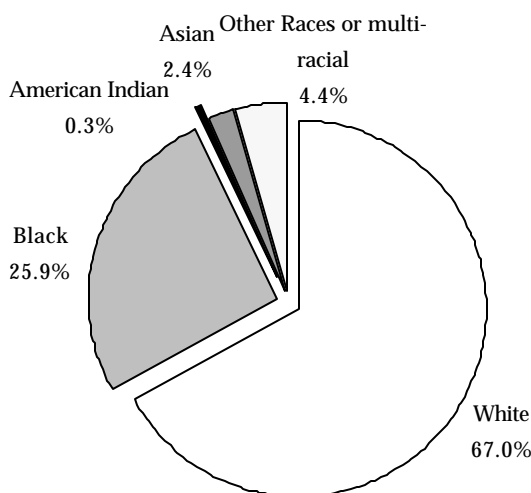
Race is a biological designation whereby group members share distinguishing features such as skin color, bone structure, and genetic traits. It is primarily a social classification that relies on physical attributes to identify group membership.¹ Ethnicity is the shared feeling of peoplehood among a group of individuals. Ethnicity represents the identifying characteristics of culture, such as race, religion, or national origin.² Whether representing actual differences or a constellation of factors that affects health and health status, race, and ethnicity are important determinants of health patterns in the United States.³ Different race/ethnic groups may have different demographic, social, economic, and health characteristics. Understanding the race/ethnic composition in our community is crucial in planning, programming, and delivering health services to a culturally and ethnically diversified population.

Race and ethnicity are, to some extent, ambiguous characteristics that tend to overlap with nativity and religion. Some studies treat race as synonymous with ethnicity because people who come from a particular racial group may also have a common ethnic and cultural identification.⁴ Other researchers have even proposed to abandon “race” as a variable in public health research.¹

Findings

Figure 8 displays the racial distribution of Nashville's population. In 2000, whites accounted for 67.0% of the population while blacks made up 25.9%. Asians accounted for 2.4%, American Indians accounted for 0.3%, and other races and multiple races made up 4.4% of population (Data Tables in Appendices).

Figure 8. Population's Racial Distribution, Nashville, TN, 2000

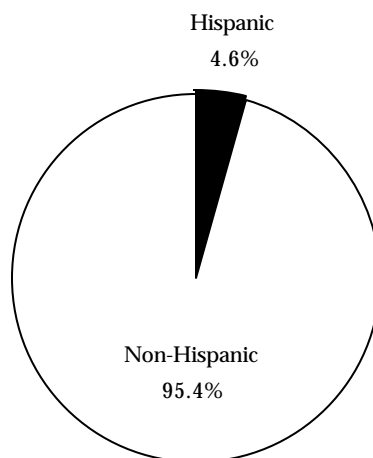


Data Sources

U.S. Bureau of the Census

Figure 9 displays the ethnic distribution of Nashville's population. In 2000, Hispanics accounted for 4.6% of the population while non-Hispanics made up 95.4% of the population.

Figure 9. Population's Ethnic Distribution, Nashville, TN, 2000



Race/ethnic groups may have different demographics, social, economic, and health characteristics.

Figure 10. Racial and Ethnic Distribution, Nashville, Tennessee, and U.S., 2000

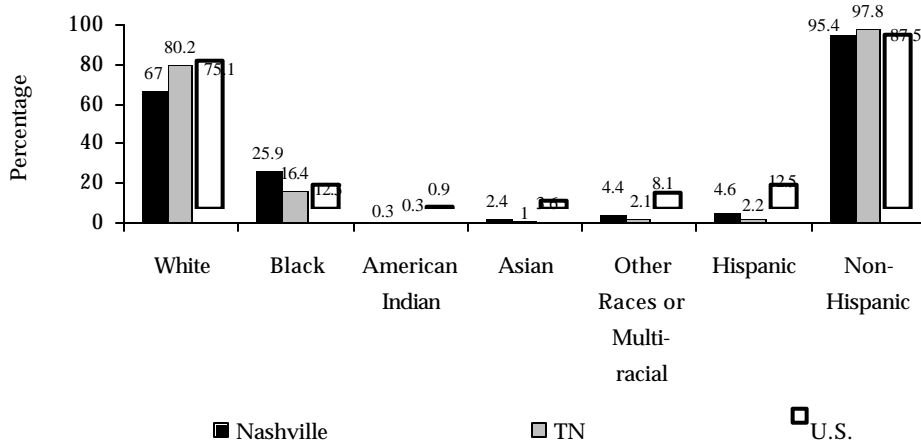


Figure 10 shows a comparison of the racial and ethnic distributions of the populations in Nashville, Tennessee, and the United States in 2000. Nashville had a higher percentage of blacks and lower percentage of whites than Tennessee or the United States. The percentage of Asians in Nashville is more than twice as high as that of Tennessee but only two thirds of that of the United States. Ethnically, the percentage of Hispanics in Nashville is more than twice as high as that of Tennessee, but less than half of the nation's Hispanic population.

Discussion

As Mayor Bill Purcell pointed out, the percentage decrease of whites and the percentage increase of nonwhites “highlight the need to address diversity, as well as specific language issues.”⁵ With a more diversified population in Nashville, the health care system will face the challenges of setting health priorities to address issues such as cultural competency among health care providers and racial and ethnic health disparities among Nashville residents.

References:

1. Bhopal R, Donaldson L. White, european, western, caucasian, or what? inappropriate labeling in research on race, ethnicity, and health. *American Journal of Public Health*. 1998;88(9).
2. Stanhope M, Lancaster J. *Community and Public Health Nursing*. St. Louis: Mosby; 1996.
3. Sondik EJ, Lucas JW, et al. Race/ethnicity and the 2000 census: implications for public health. *American Journal of Public Health*. 2000;90(11).
4. Friss, RH, Sellers, TA. *Epidemiology for Public Health Practice*. 2nd Edition. Gaithersburg, MD: Aspen Publishers, Inc; 1999.
5. Wadhwani A. Davidson: nonwhite population growth highlights diversity issue. *Tennessean*. 12A, March 23, 2001.

In 2000, Nashville had a higher percentage of blacks and a lower percentage of whites than Tennessee and the United States.

Related Indicators

- Unemployment
- Poverty levels
- Income
- Single parent family
- Non-English speaking population
- Health status

Additional Data

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U.S. Bureau of the
Census

2.1.1.4 Educational Attainment (Persons 25 years and Over)

Background

Education is a widely used indicator of socioeconomic status in the United States. Education impacts health through a variety of cultural, social, and psychological mechanisms and is related to its influence on individuals' earning power and health related values such as a belief in disease prevention.¹ The number of years of formal education has been shown to be strongly related to age-adjusted mortality in six different countries.² In addition, a mother's educational attainment is a key determinant of child welfare and survival.³

The average level of education in the U.S. population has increased steadily over the past several decades. Higher levels of education may increase the likelihood of obtaining or understanding the health-related information needed to develop health-promoting behaviors and beliefs in prevention.⁴ Higher levels of education appear to be the strongest and most important predictor of positive health status.⁵

Educational attainment information for the residents of Nashville is obtained from the Census 1990 and Census 2000 data. It is noted that the Census undercounts some groups, such as the homeless and young adults. In addition, some people are not counted while others are counted more than once. It is also noted that comparisons between censuses are affected by changes in question wording and in the definition of the population concerned. The age structure of the population may influence the indicator: an older population, for instance, generally has lower education levels than a younger population due to improved access to education over time.⁶

Findings

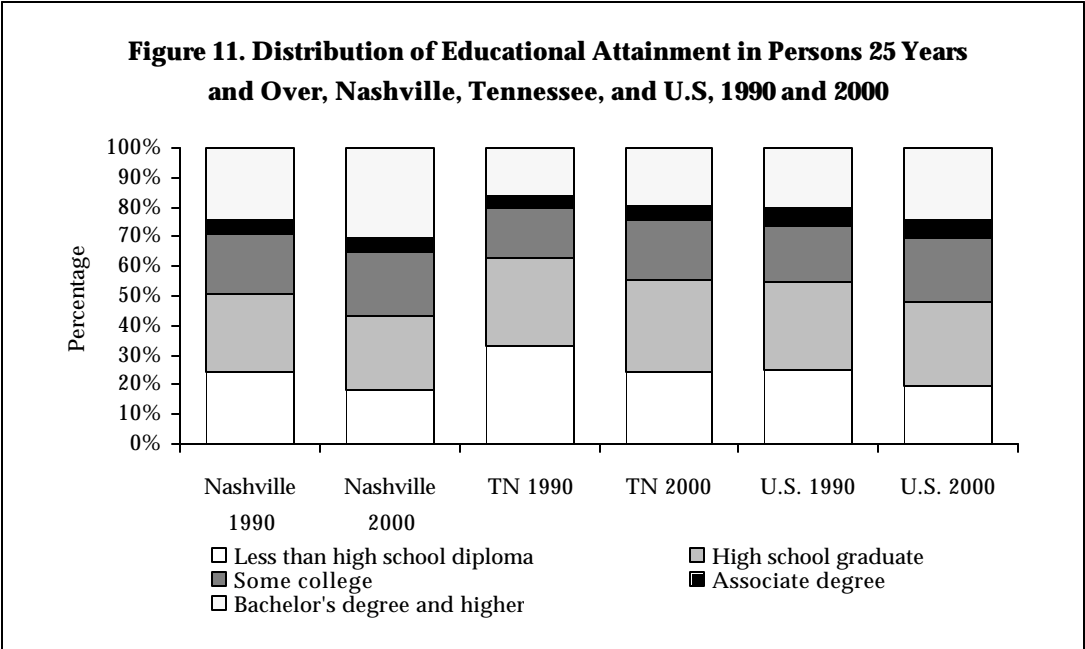
From Figure 11, it is clear that during the last decade, Nashvillians made progress in educational attainment. For individuals aged 25 and over, the percentage of those who have less than a high school diploma decreased from 24.1% in 1990 to 18.4% in 2000, while the percentage of those who have a bachelor's degree and higher increased from 24.4% in 1990 to 30.5% in 2000.

Figure 11 also displays that more than half of Nashville's population received some form of higher education in 2000 (some college, associate degree, and bachelor's degree and higher, (56.9%), which is a higher percentage than that of Tennessee (44.3%) and of the United States (51.7%).

Discussion

Nashville has a relatively higher proportion of educated people than Tennessee and the United States. This is good news for the public health community in terms of mobilizing our community for action through planning and partnership to promote health and to control diseases. The challenge is how to use this invaluable community asset to optimize Nashville's environment so that all Nashvillians can be healthy.

Nashville has a relatively higher proportion of educated people than Tennessee and the United States.



References:

1. Pamuk ER, Makuc DM, et al. *Socioeconomic Status and Health Chartbook. Health, United States, 1998*. Hyattsville, MD: National Center for Health Statistics; 1998.
2. Valkonen, T. Adult mortality and level of education: a comparison of six countries. In: J. Fox, ed. *Health Inequalities in European Countries*. Aldershot, England: Gower; 1989.
3. Zill, N. II, Brim, O.G., Jr. Development of childhood social indicators. In: E.F. Zigler, S.L.Kegan, and E. Klugman, eds. *Children, Families, and Government: Perspectives on American Social Policy*. New York: Cambridge University Press; 1983.
4. U.S. Department of Health and Human Services. *Healthy People 2010* (Conference Edition, in Two Volumes). Washington, D.C.: January 2000.
5. Winkelby MA, Jatulis DE, et al. Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. *Am. J. Public Health*. 1992;82:816-820.
6. Association of Public Health Epidemiologists in Ontario. *Core Population Health Indicators for Ontario* [online]. Available at: <http://www.cehip.org/apheo/>. Accessed March 26, 2002.

Higher levels of education appear to be the strongest predictor of positive health status.

Related Indicators

- Poverty level
- Income
- Single parent family
- Non-English speaking population
- Educational attainment
- Health status

2.1.1.5 Unemployment

Background

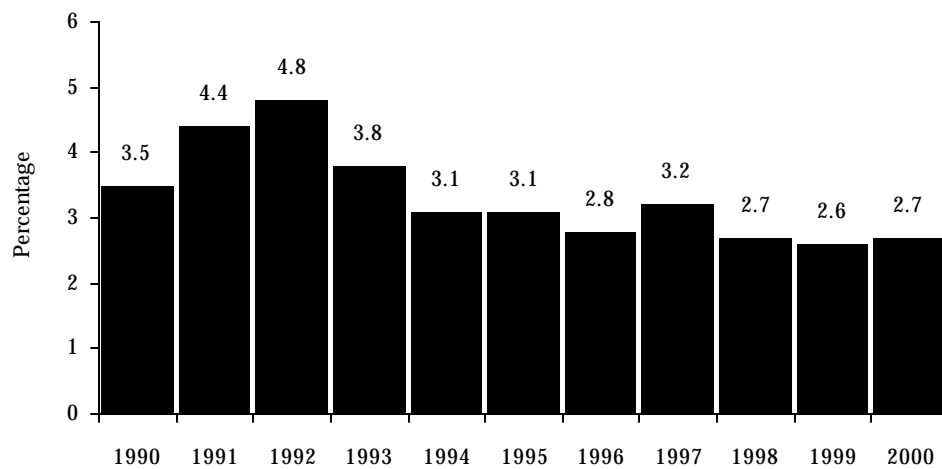
Unemployment is frequently used as an indicator of socially disadvantaged status. It may be associated with increasingly difficult living conditions, low socioeconomic status, and health and social problems.¹ According to the official measure used in the United States, the unemployment rate is the number of people who have been recently seeking work divided by the number of people who are in the labor force.² Numerous studies document the relationship between unemployment and health. A longitudinal study in the United Kingdom found excess mortality among the unemployed and suggests that unemployment may cause socio-economic hardship and stress which can lead to negative health consequences.³ A study on a Swedish plant closure reported evidence for consistent increases in cholesterol and decreased immune reactions among those who were laid off.² Unemployment has also been associated with an increase in unhealthy behaviors such as alcohol and tobacco consumption, which may lead to increased risk for disease, injury, and death.²

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Tennessee's unemployment figures are based on two surveys, the Current Population Survey and the Business Survey.⁴ Each month, the Federal Bureau of Labor Statistics randomly surveys sixty thousand individuals around the nation. If respondents say they are both out of work and seeking employment, they are counted as unemployed members of the labor force. Jobless respondents who have chosen not to continue looking for work are considered out of the labor force and are therefore, not counted as unemployed.⁵ Since the unemployment rate does not take into account persons who have stopped actively looking for a job, it may underestimate the true unemployment situation.⁶ In addition, there is an acceptable low level of unemployment. In the early 1960s, an unemployment rate of 4 percent was both desirable and achievable, i.e., full employment was considered to exist.^{5,7}

Figure 12. Unemployment Rates, Nashville, TN, 1990-2000



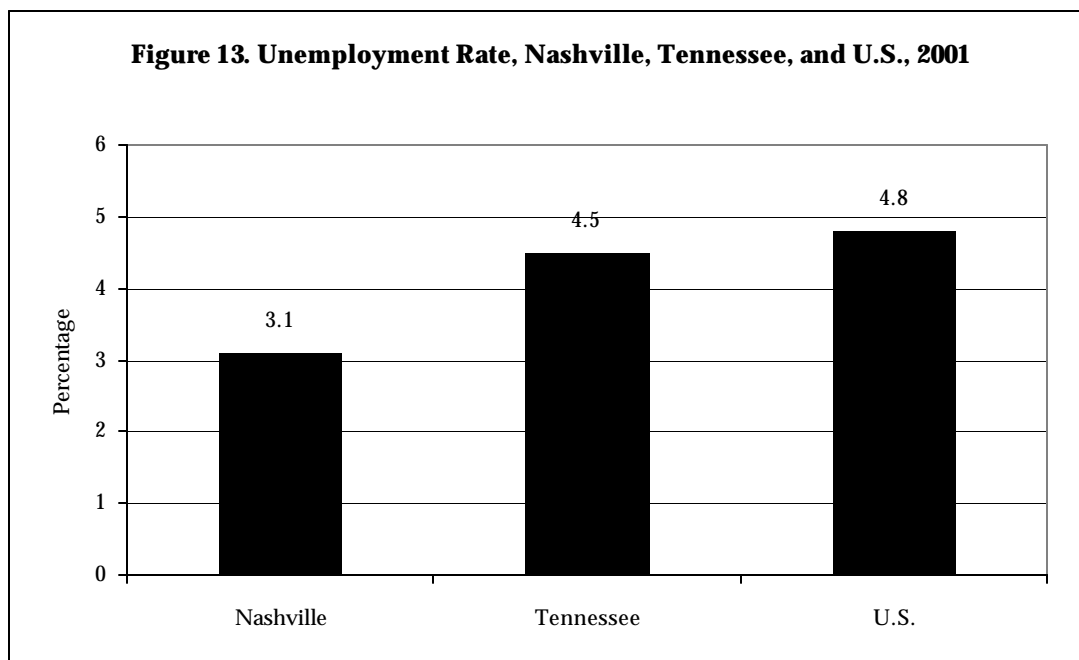
Data Sources

U.S. Bureau of the
Census
Nashville Area Chamber
of Commerce

Findings

Figure 12 reveals the trend of unemployment in Nashville, TN from 1990 to 2000. During the 11-year period examined, only two years in the early 1990s (1991 and 1992) had unemployment rates higher than 4%. Beginning in 1993, Nashville had a continuous low unemployment rate for 8 years.

If we compare the 2001 unemployment rate of Nashville with that of Tennessee and the United States, it seems clear that Nashville has the lowest unemployment rate of the three (Figure 13).



Discussion

Low unemployment rates in Nashville for most of the last decade indicate that our community is healthy and economically viable. Since no data is available regarding the unemployment situation among sub-population groups in our community, further study is needed to see if unemployment is contributing to our community's racial disparity in health.

In 2001, Nashville had a lower unemployment rate than Tennessee and the United States.

References:

1. Bernier L, Sauvageau Y, et al. *User's Guide to 40 Community Health Indicators*. Health and Welfare Canada; 1992.
2. Dooley D, Fielding J, Levi L. Health and unemployment. *Annu.Rev. Public Health*. 1996;17:449-65.
3. Detels R, Holland WW, et al. *Oxford Textbook of Public Health*. 3rd ed. New York: Oxford University Press; 1997.
4. Tennessee Department of Labor and Workforce Development. Available at: <http://www.state.tn.us/labor-wfd/news/marchstate2002.pdf>. Accessed March 28, 2002.
5. Summers LH. Unemployment, the concise encyclopedia of economics [online]. Available at: <http://www.econlib.org/library/Enc/Unemployment.html>. Accessed March 28, 2002.
6. Association of Public Health Epidemiologists in Ontario. Core population health indicators for ontario [online]. Available at: <http://www.cehip.org/apheo>. Accessed March 26, 2002.
7. Nashville Area Chamber of Commerce. *1998 Guide for Community Improvement*. 1999.

The unemployment rate is the measure of people who have been recently seeking work divided by the number of people who are in the labor force.

Related Indicators

- Unemployment
- Income
- Single parent family
- Non-English speaking population
- Educational attainment
- Health status

2.1.1.6. Poverty Level

Background

Poverty is defined as having insufficient financial resources to meet basic living expenses. These expenses include costs of food, shelter, clothing, transportation, and medical care. For years, income level has been used as the criterion to determine poverty status.¹ The U.S. Census Bureau uses a set of income thresholds that vary by family size and composition to determine who is poor. If a family's total income is less than the calculated threshold, then that family, and every individual in it, is considered poor.² While income continues to be the measurement of choice, the federal poverty guidelines have been renamed "federal income guidelines."¹

Poverty is known to be associated with poor health. Persons living in poverty and near-poverty have higher rates of chronic diseases, higher infant morbidity and mortality, shorter life expectancy, and more complex health problems. These poor health outcomes are often secondary to inadequate access to health care.¹ The poverty level is a useful indicator to enable us to identify groups at risk for specific health problems such as malnutrition or poor housing conditions and to plan for health services for economically disadvantaged sub-populations.³

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There is an arbitrary element in the criteria used to determine poverty levels. Although living expenses vary from one area to another the poverty thresholds do not vary geographically.² In addition, the poverty level does not consider the near-poor or low wage-earners who have incomes barely above the poverty level and who might have living conditions similar to persons below the poverty line.³ It should be noted that poverty level is the cut-off point for the financial resources necessary for basic material survival. It is not an indicator of general welfare and gives no information on the intensity or the duration of poverty.³

Findings

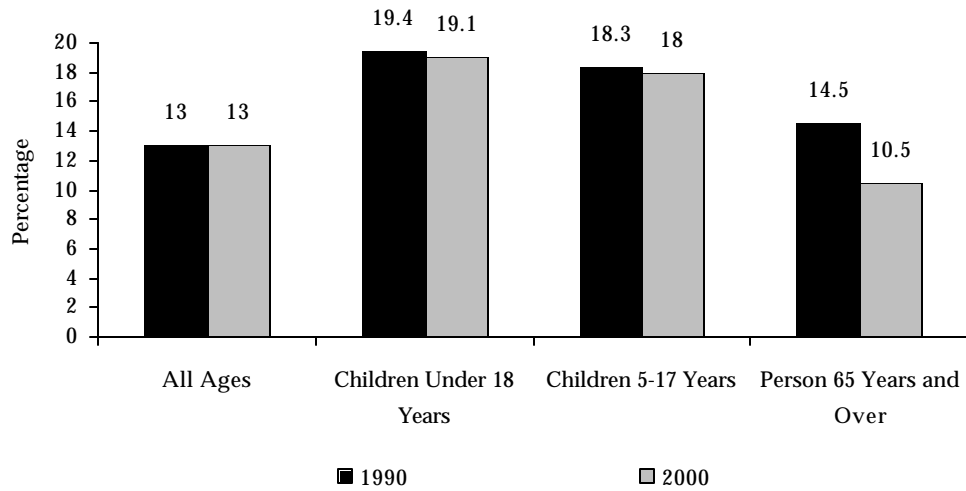
Figure 14 compares the percentages of individuals below the poverty level in Nashville, TN for 1990 and 2000. Overall, the percentage of the population below the poverty level did not change during the last decade. The percentage of children under 18 years of age and children between the ages of 5 to 17 below the poverty level decreased slightly (from 19.4% to 19.1% and from 18.3% to 18.0%, respectively). However, the percentage of persons ages 65 and over below the poverty level decreased remarkably, from 14.5% to 10.5%.

Figure 15 compares the percentages of individuals below the poverty level in Nashville with that of Tennessee and the United States. Overall, Nashville has fewer individuals below the poverty level compared to Tennessee and more individuals below the poverty level compared to the United States proportionally. For children under 18 years of age and children 5 - 17 years of age, Nashville has a larger percentage of persons below poverty level compared to Tennessee and the United States. For persons 65 years and older, Nashville's percentage is better than Tennessee and worse than the nation. For families with a female householder, no husband present, Nashville has a smaller percentage of persons below poverty level compared to Tennessee and a larger percentage compared to the nation.

Data Sources

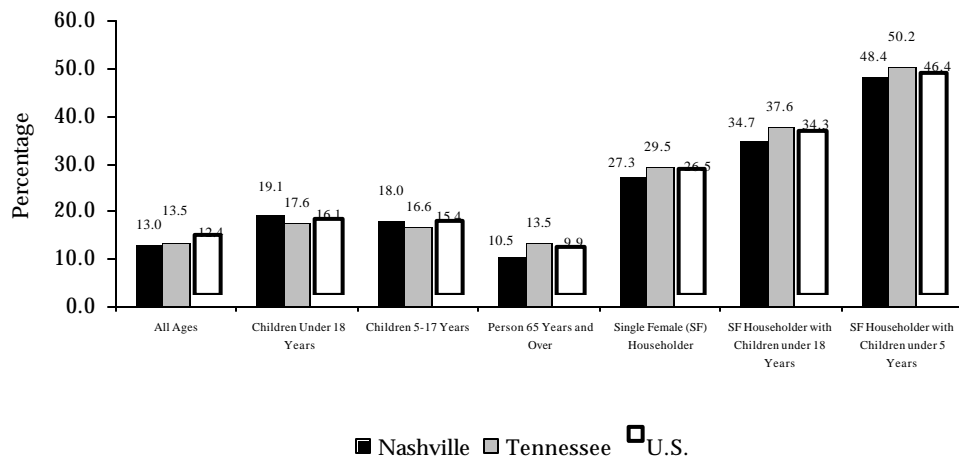
U.S. Bureau of the Census

Figure 14. Percentage of the Population Below the Poverty Level, Nashville, TN, 1990 and 2000



The fact that relatively higher percentages of elderly people live below the poverty level in Nashville presents a challenge to our community.

Figure 15. Percentage of Persons Below the Poverty Level, Nashville, Tennessee, U.S., 2000



Discussion

Poverty is associated with poor health. The fact that relatively higher percentages of elderly people live below the poverty level in Nashville presents a challenge to our community. The major causes of death among Nashvillians aged 65 and over are heart disease, cancer, and stroke. ⁴ Many cases of these diseases are preventable, or at least partially preventable. Poverty is one of the risk factors that needs to be addressed in order to prevent these diseases and to ensure a high quality of life among our senior citizens.

The higher percentage of single female householders with children under 18 years of age and under 5 years of age below the poverty level in Nashville calls upon us to enhance our maternal and child health services. (See more discussion in Section 2.1.1.8.) It is important to ensure at the community level that primary and preventive health care is available and accessible to all children regardless of their economic status.

References:

1. Stanhope M, Lancaster J. *Community and Public Health Nursing*. St. Louis: Mosby; 1996.
2. U.S. Census Bureau. How the census bureau measures poverty [online]. Available at: <http://www.census.gov/prod/2001pubs/p60-214.pdf>. Accessed April 1, 2002.
3. Bernier L, Sauvageau Y, et al. *User's Guide to 40 Community Health Indicators*. Health and Welfare Canada; 1992.
4. Division of Epidemiology, Metropolitan Public Health Department of Nashville and Davidson County. *1997 Mortality Assessment, Davidson County, TN*. 1999.

The higher percentage of single female householders with children under 18 years of age and under 5 years of age below the poverty level in Nashville calls upon us to enhance our maternal and child health services.

Related Indicators

- Unemployment
- Poverty level
- Single parent family
- Educational attainment
- Health status

2.1.1.7. Income

Background

Income, along with education, form the two main indicators of socioeconomic status. Income is related to many health indicators. Adults with low incomes are far more likely than those with higher incomes to report fair or poor health status. Individuals with low family income are less likely to have health insurance coverage than higher income individuals. Children in lower income families are less likely to receive needed health care. Overweight is inversely related to family income.¹

There are several indicators to measure income. Median household income and per capita income are frequently used as income indicators. Median household income is defined by the U.S. Census Bureau as the amount which divides the household income distribution into two equal groups, half with incomes above the median, and half with incomes below the median. The medians are based on people age 15 years and older with income. Per capita income is defined as the average income computed for every man, woman, and child in a particular group. The Census Bureau derives per capita income by dividing the total income of a particular group by the total population in that group (excluding patients or inmates in institutional quarters).²

Household income is influenced by the number of earners per household. Inflation is often a significant component of apparent growth in any series measured in dollars. The data presented here is in both “current dollars” and “constant dollars,” or inflation adjusted dollars (2000\$).³

Findings

Based on the U.S. Census Bureau 2000 Census data, Nashville’s median household income is higher than that of Tennessee and lower than that of the United States (Figure 16).

Additional Data

Appendices
page D-24

Data Sources

Nashville Area Chamber
of Commerce
U.S. Bureau of the
Census

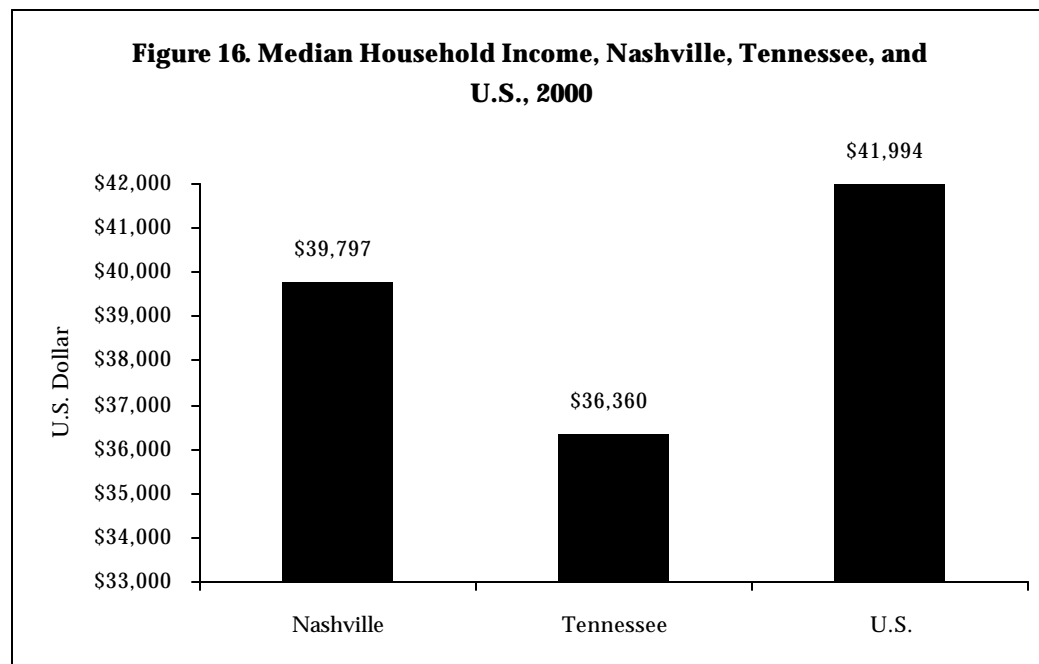
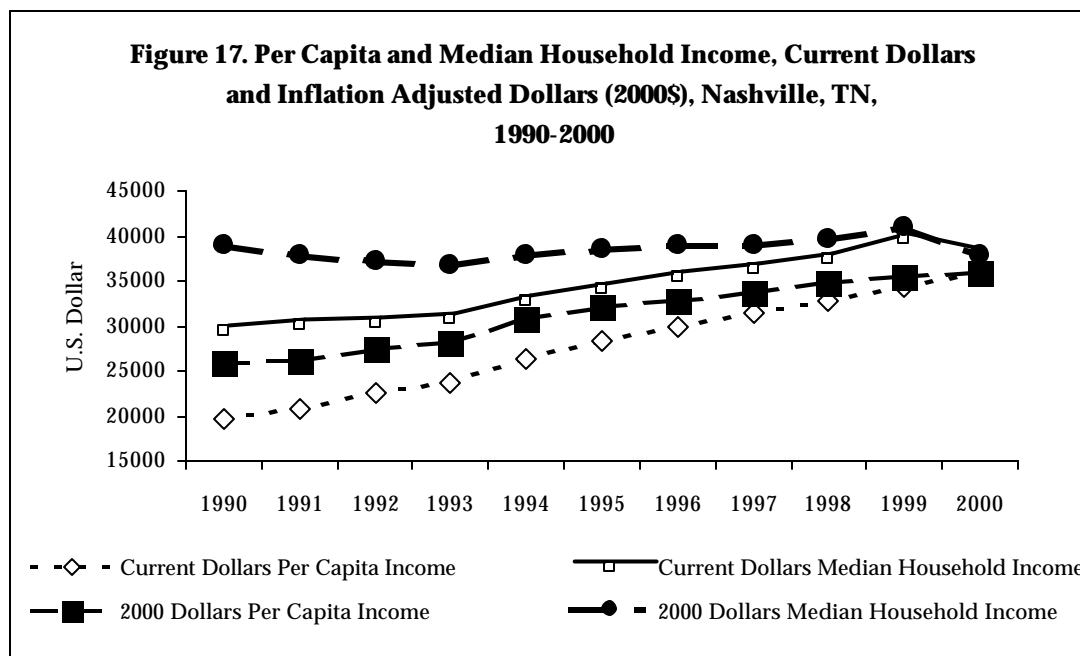


Figure 17 displays the income trend data for Nashville. (The data is from the Nashville Area Chamber of Commerce.⁴) The data suggests that the per capita income increased steadily regardless of whether or not it was measured by current dollars or inflation adjusted dollars. For median household income, the current dollar measure indicates an increasing trend except for the year 2000. Whereas, inflation adjusted dollar (2000\$) measures display a flat line, suggesting little change in median household income during the last decade.



Income inequality in the United States increased during the last three decades.

Discussion

Income inequality in the United States increased during the last three decades.¹ Although no local data is currently available to assess the income inequality issue in our community, an increase in per capita income and virtually no-change in median household income during the last decade may suggest increased income inequality in Nashville.

Income inequality may have some negative impacts on the health of the community. The association between income and health may be due to the influence of income on access to medical care, choice of neighborhoods and housing, and engagement in health-promoting behaviors. Inversely, poor health can have negative impact on income. For example, poor health may restrict the type or amount of employment or prevent an individual from working full-time.¹

References:

1. Pamuk ER, Makuc DM, et al. *Socioeconomic Status and Health Chartbook. Health, United States, 1998*. Hyattsville, MD: National Center for Health Statistics; 1998.
2. U.S. Census Bureau. Available at: <http://www.census.gov/population/www/cps/cpsdef.html>. Accessed March 22, 2002.
3. American Institute of Economic Research. Cost of living calculation [online]. Available at: <http://www.aier.org/cgi-bin/colcalculator.cgi>. Accessed March 25, 2002.
4. Nashville Area Chamber of Commerce. *2000 Guide to Community Improvement Overview*. 2002.

Related Indicators

- Unemployment
- Income
- Poverty level
- Educational attainment
- Health status

2.1.1.8 Single Parent Family

Background

The family can influence an individual's concept of health and illness by providing an environment that affects health values, health habits, health risk perception, and health care seeking behavior.¹ A stable family is one of the essential factors in the healthy development of a child.² The family structure plays a critical role in influencing health. The traditional nuclear family of married couples and the proportion of children living with two parents has decreased, while the number of single parent families has increased since 1960.²

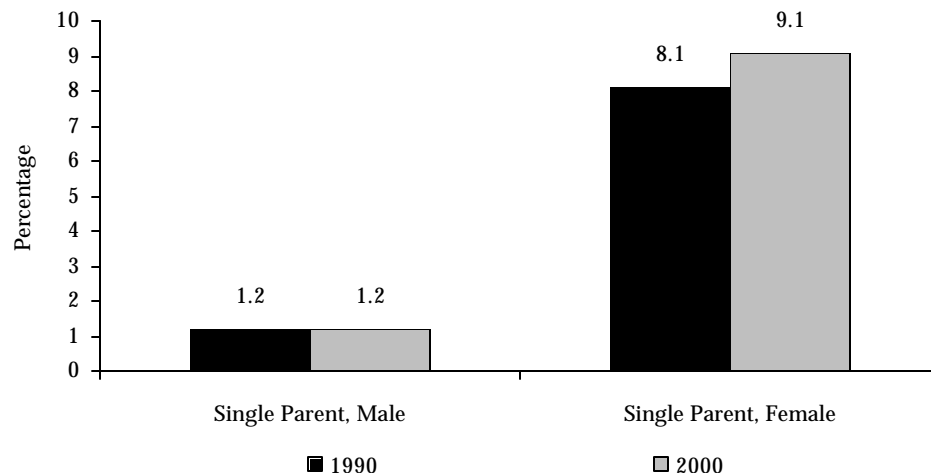
Single parent families have become an important type of American family structure that has a significant impact on individual and community health. The single parent family may be represented by the persons who voluntarily never married with biological or adopted children, other persons who involuntarily never married with children, the formerly married widow with children, or the divorced parent with children.¹ In the United States, single mothers are six times more likely than single fathers to be raising children, and the percentage of single mothers below the poverty level is higher than that of married couples. Furthermore, a higher proportion of black and Hispanic female-headed households are below the poverty level.^{1,3} Therefore, single parent families are an important indicator in assessing the impact of family structure changes upon the health status of family and the community.

Additional Data

Appendices
page D-24

It is important to note that a family, according to the U.S. Census Bureau, is a group of two or more people (one of whom is the householder) who are related by birth, marriage, or adoption and reside together; all such people (including related subfamily members) are considered members of one family. The number of families is equal to the number of family households. Beginning in 1980, the Bureau of the Census replaced the terms "head of household" and "head of family" with the terms "householder" and "family householder."⁴

Figure 18. Percentage of Single Parent Households with Children under 18, Nashville, TN, 1990 and 2000



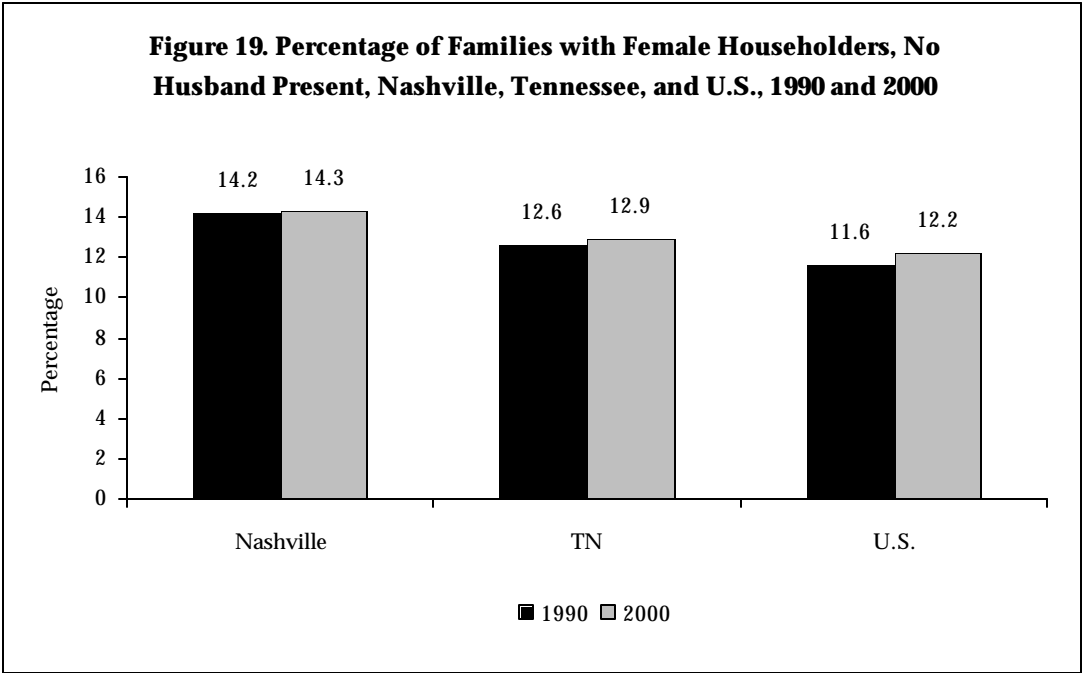
Data Sources

U.S. Bureau of the
Census

Findings

Figure 18 reveals that from 1990 to 2000 the percentage of single father families with children under 18 remained the same while the percentage of single mother families increased by 12.3%.

Figure 19 compares the percentage of families with female householder and no husband present in Nashville, Tennessee, and the United States. In both 1990 and 2000, Nashville had a higher percentage of female-headed families than Tennessee and the United States. The percentage of families with female householder in Nashville increased slightly from 1990 to 2000.



In both 1990 and 2000, Nashville had a higher percentage of female-headed families than Tennessee and the United States.

Discussion

Single parents, especially single mothers, bear both responsibilities of home and job. These overburdening responsibilities often create a lot of stress. Stress and feelings of isolation may lead to depression.¹ With nearly one tenth (9.1%) of the families in Nashville being single mother families, the importance of social networks comprised of family, friends, and mental health services cannot be overemphasized.

Although single parent families are gaining more acceptance today, they still represent a deviation from the highly valued nuclear family norm.⁵ Single parent families experience higher levels of stress and greater than average demands for mental health services and child health services.¹ It is important to remember this special population in our community when planning for mental health and child health services.

References:

1. Stanhope M, Lancaster J. *Community and Public Health Nursing*. 5th Ed. St. Louis: Mosby; 2000.
2. Kotch JB, ed. *Maternal and Child Health: Programs, Problems, and Policy in Public Health*. Gaithersburg, MD: Aspen Publishers, Inc; 1997.
3. U.S. Department of Health and Human Services. *Health Status of the Disadvantaged: Chartbook 1990*.
4. U.S. Census Bureau. Current population survey (CPS) - definitions and explanations [online]. Available at: <http://www.census.gov/population/www/cps/cpsdef.html>. Accessed April 9, 2002.
5. Gilliss CL, Highley Bland, et al. *Toward a Science of Family Nursing*. Menlo Park, CA: Addison-Wisley Publishing Company; 1989.

With nearly one tenth (9.1%) of the families in Nashville being single mother families, the importance of social networks comprised of family, friends, and mental health services cannot be overemphasized.

Related Indicators

- Population growth rate
- Population distribution by age and gender
- Race/ethnic composition of population

Additional Data

Appendices
pages D-27 - 28

Data Sources

U.S. Bureau of the Census
Metropolitan Planning
Commission

2.1.1.9 Population Density

Background

Population density is a demographic indicator that will enable us to acquire a good understanding of the population in a community and how it is changing. It provides useful information for health service planning and targeted public health intervention. Population density is commonly presented as the number of persons per square mile, calculated by the total population divided by land area in square miles. Density can be calculated for any area and any sub-population.

It is common to associate the concept of a population with the total population; however, sub-population or neighborhood data are often more valuable for addressing community concerns.¹ For this reason, we present population density data at the county, planning district, and council district levels. We also present population density data by different sub-population groups. Since populations and sub-populations are not homogeneous in regard to health issues, and they are not equally distributed in a specific land area, population density data should be used with caution.

Findings

Figure 20 shows that Nashville has a higher population density when compared with that of Tennessee and the United States.

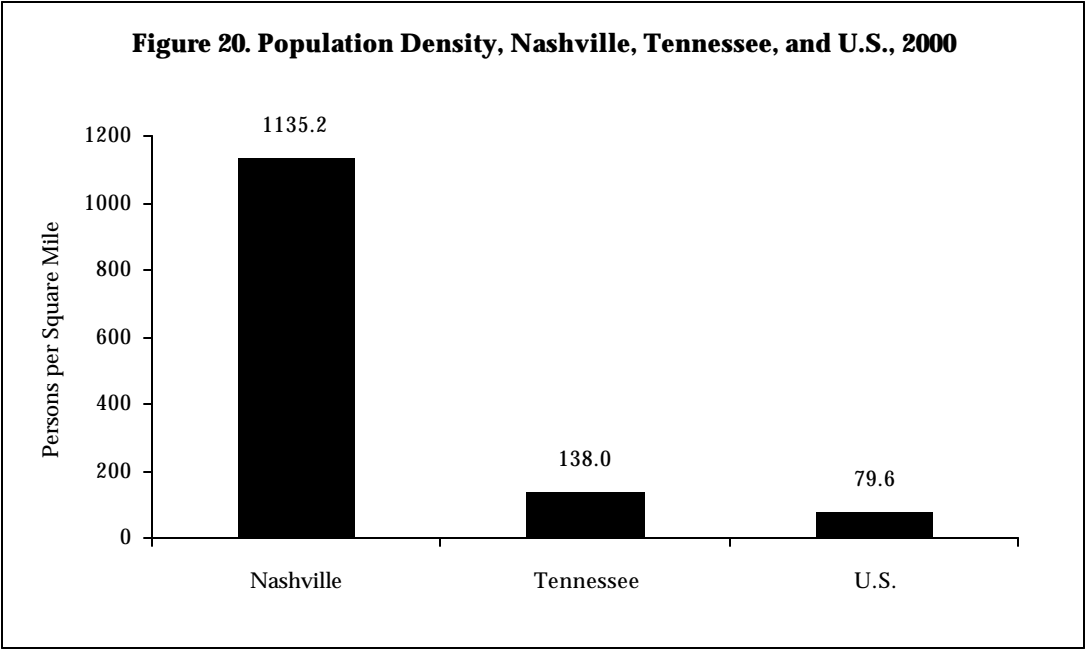
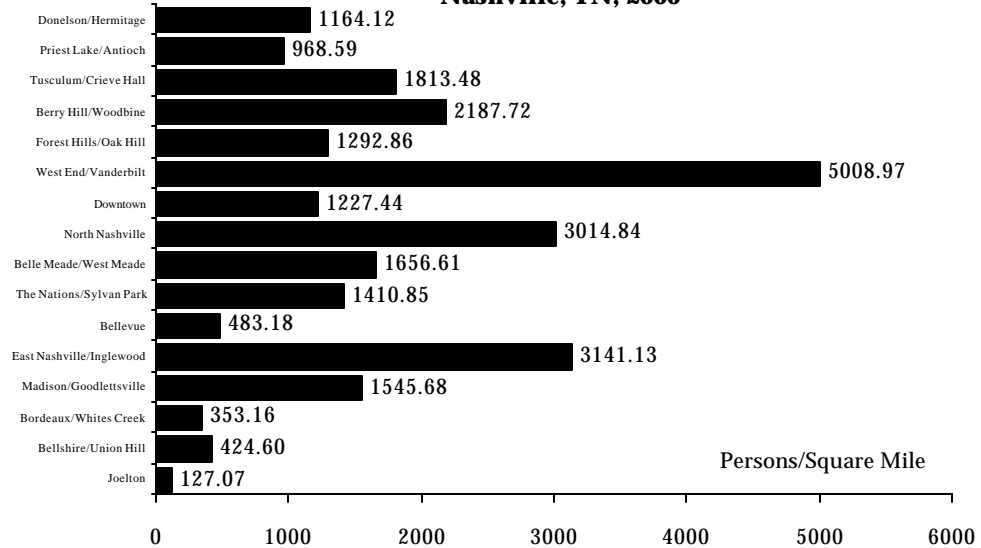


Figure 21 reveals population density by planning district. Planning district 10a (West End/Vanderbilt) is the most dense district while planning district 1 (Joelton) is the least dense district.

Figure 21. Population Density by Health Planning District, Nashville, TN, 2000



Population density is commonly presented as the number of persons per square mile, calculated by the total population divided by land area in square miles.

Figure 22. Population Density by Council District (1991-2002), Nashville, TN, 2000

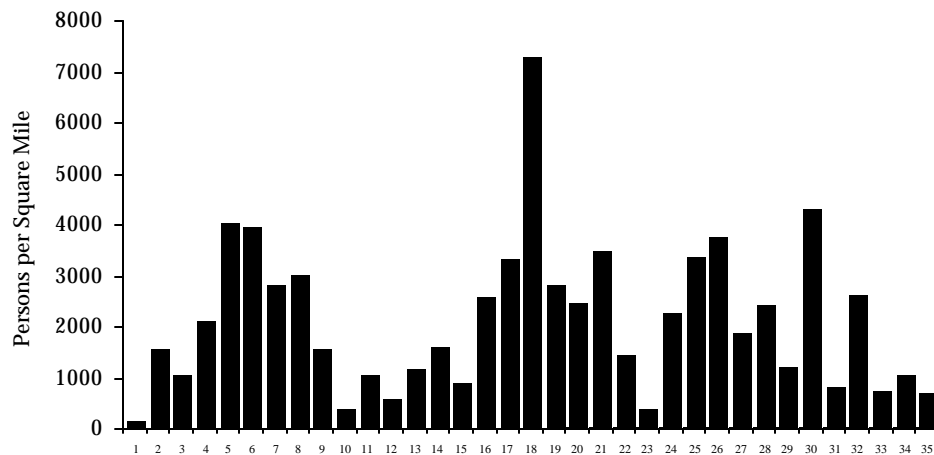
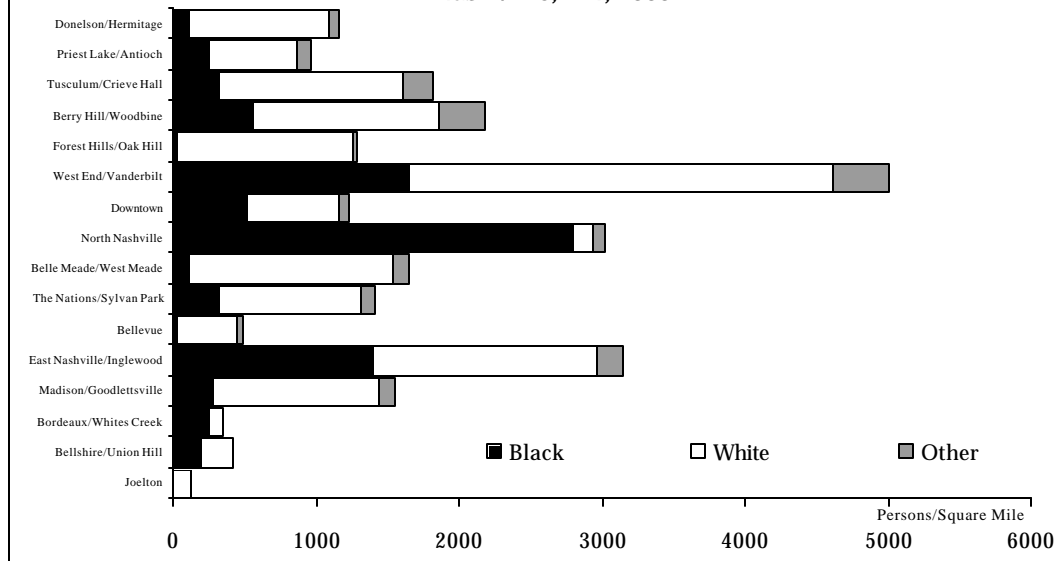


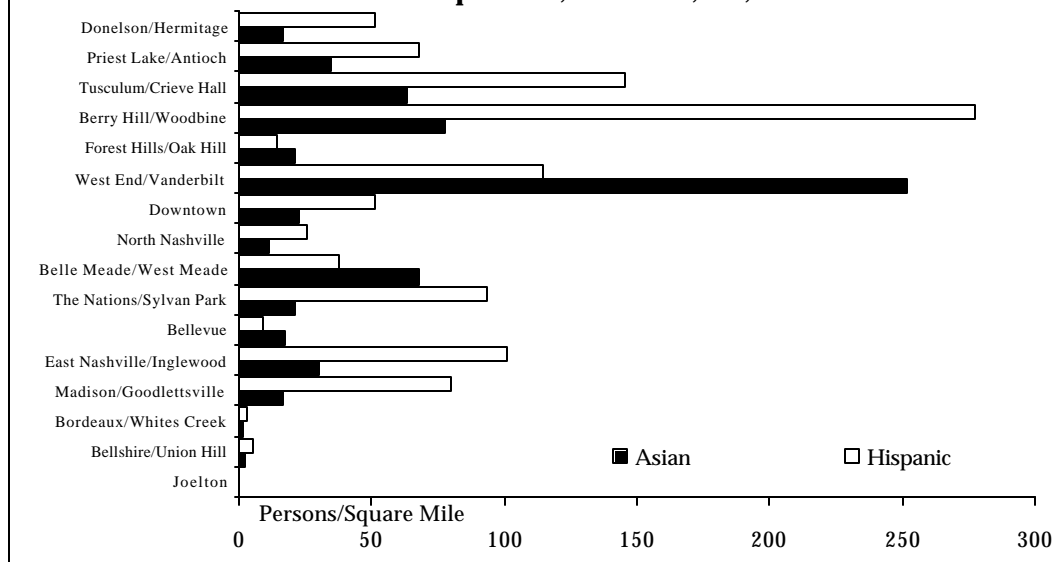
Figure 22 reveals population density by council district for years 1991 - 2002. Council district 18 is the most dense district, while council district 1 is the least dense district. When the council districts were redrawn based on 2000 Census data for years 2003 and forward, the most dense and least dense council districts were still 18 and 1, respectively.

Figure 23. Population Density by Race and Health Planning District, Nashville, TN, 2000



Planning district 6 (West End/Vanderbilt) and council district 18 have the highest population densities (persons per square mile) for whites and other races while planning district 8 (North Nashville) and council district 5 have the highest population densities for blacks.

Figure 24. Population Density by Health Planning District, Hispanic and Asian Population, Nashville, TN, 2000



Figures 23 to 28 display population densities for different racial and gender groups according to 2000 census data estimates. Planning district 10a (West End/Vanderbilt) and council district 18 have the highest population densities (persons per square mile) for whites and other races while planning district 8 (North Nashville) and council district 5 have the highest population densities for blacks. For the Hispanic population, planning district 11 (Berry Hill/Woodbine) and council district 26 have the highest population densities, while the Asian population is most dense in planning district 10a

For the Hispanic population, planning district 11 (Berry Hill/Woodbine) and council district 30 have the highest population densities.

Figure 25. Population Density by Gender and Health Planning District, Nashville, TN, 2000

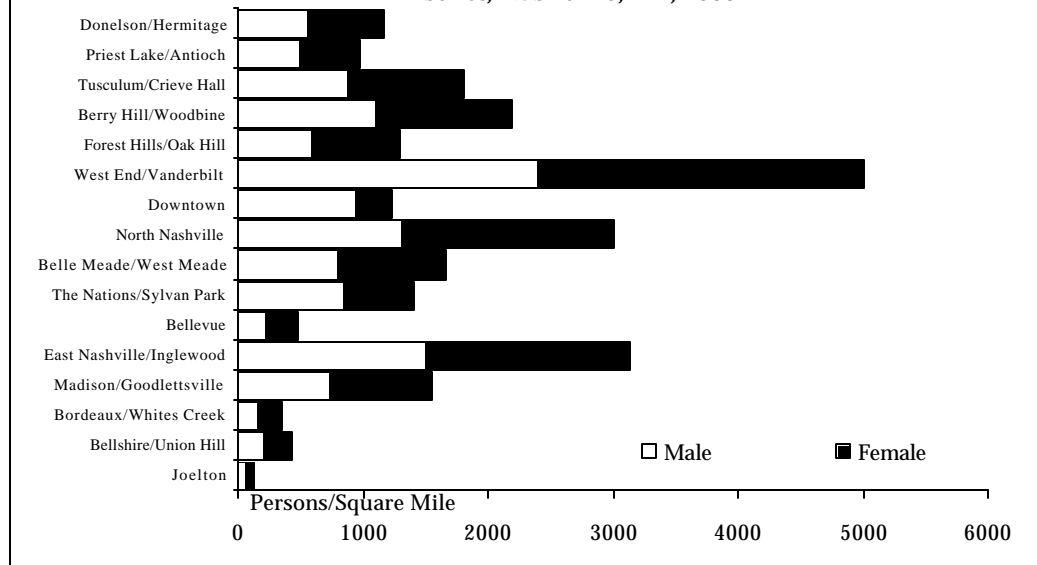
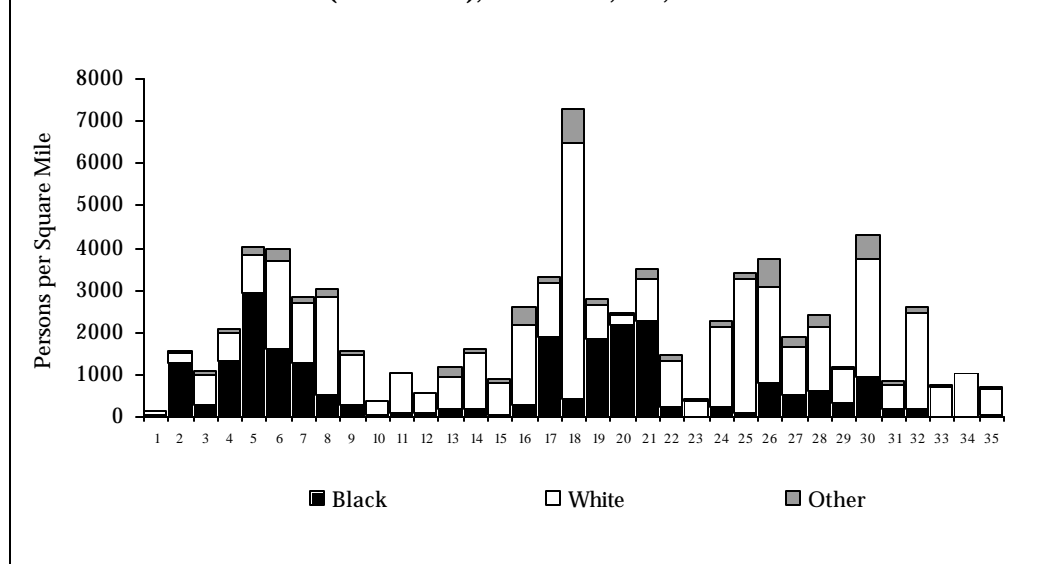
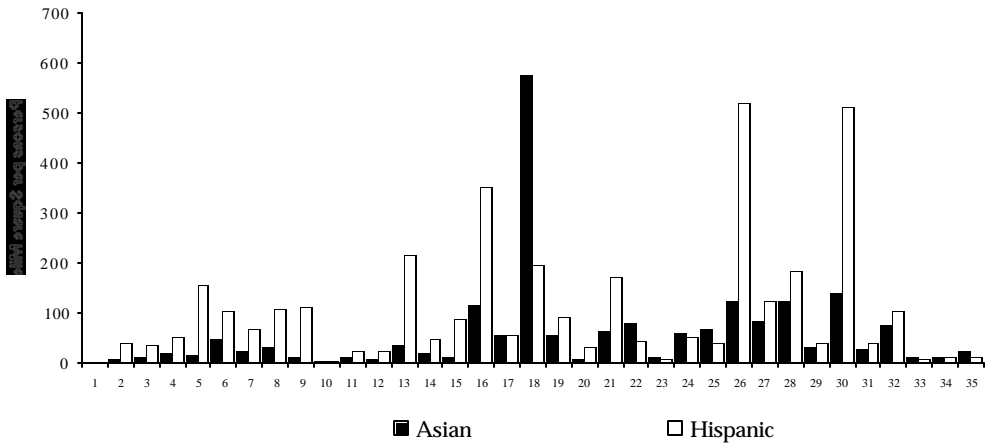


Figure 26. Population Density by Race and Council District, (1991 - 2002), Nashville, TN, 2000



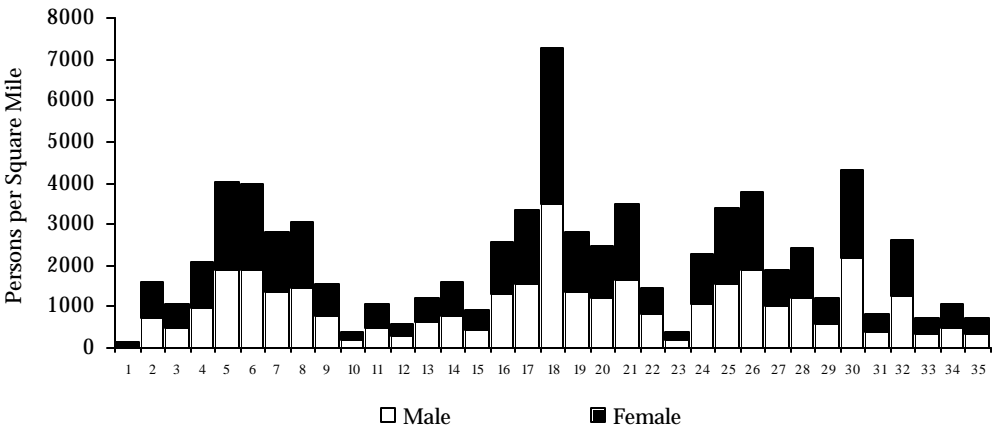
(West End/Vanderbilt) and council district 18. When the council districts were redrawn based on 2000 Census data for year 2003 forward, the most dense council districts for whites and Asians did not change. However, the most dense council district for blacks changed from council district 5 to council district 21; for Hispanics, it changed from council district 26 to council district 30; and for those of other races, it changed from council district 18 to council district 30 (see Data Table 23).

Figure 27. Population Density by Council District (1991-2002), Hispanic and Asian Populations, Nashville, TN, 2000



The Asian population is most dense in planning district 10a (West End/Vanderbilt) and council district 18.

Figure 28. Population Density by Gender and Council District (1991-2002), Nashville, TN, 2000



Discussion

As the largest metropolitan center in Tennessee, Nashville's higher population density is expected. Because of higher population density and diversified distribution of different sub-populations in the area, health service planning and public health interventions need to be designed accordingly.

It is important to note that different racial groups are not equally distributed in Nashville. In other words, some racial groups are concentrated in certain areas. Therefore, to eliminate health disparities in our community, a geographically targeted approach should be considered.

Reference:

1. Fos PJ, Fine DJ. *Designing Health Care for Population*. San Francisco: Jossey-Bass; 2000.

Different racial groups are not equally distributed in Nashville.

Related Indicators

- Poverty level
- Income
- Health care providers

2.1.1.10 Lack of Health Insurance

Background

Lack of health insurance may severely restrict a person's access to timely and quality medical care which can negatively affect a person's health. Failure to get medical treatment for minor conditions can lead to major health complications; for example, untreated bronchitis can lead to pneumonia, a much more serious health problem. Similarly, failure to get preventive medical care such as routine screenings for cervical, breast, or colon cancer may result in a cancer not being identified until a later stage, when treatment options are limited and the chance for survival is much lower.

The U.S. Census Bureau estimates that in 2000 approximately 14% of the U.S. population did not have health insurance coverage.¹ Those most likely to lack health insurance were young adults between the ages of 18 and 24, people with lower levels of education, and people in households with annual incomes of less than \$25,000. The Healthy People 2010 objective is for 100% of the U.S. population to have health insurance by the year 2010.

Additional Data

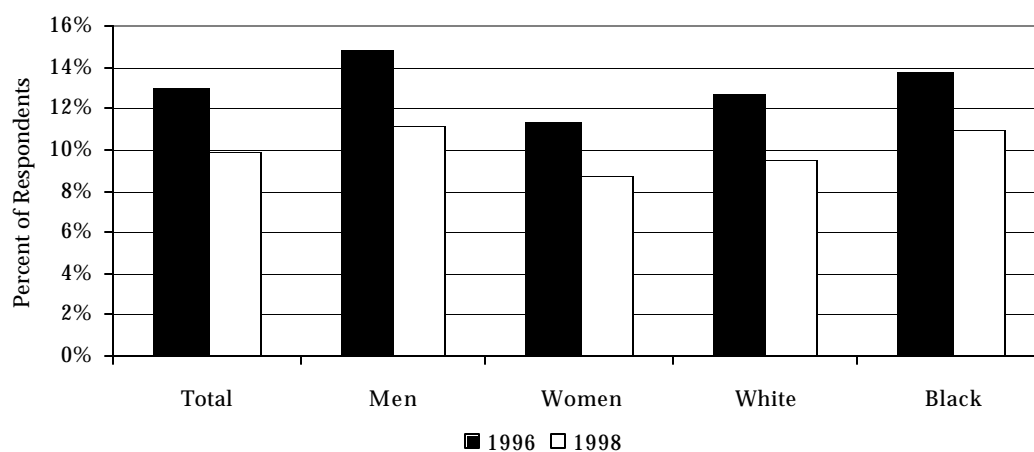
Appendices
pages D-25 - D-26

To estimate health insurance coverage in Nashville, data from the Nashville Behavioral Risk Factor Surveillance Surveys (BRFSS) was used. In both 1996 and 1998, the survey asked respondents "Do you have any kind of health coverage, health insurance....?". The surveys also asked respondents who did not have coverage how long they had been without it. For the purposes of this report, respondents who reported that they did not have insurance or said they didn't know if they had insurance were classified as uninsured.

Findings

Since Medicare is available to nearly all persons age 65 and older, findings in this report concentrate on nonelderly adults – those aged 18 to 64 years. Thirteen percent (13%) of nonelderly adult respondents reported being uninsured in 1996 (Figure 29). Slightly more

Figure 29. Percentage of Respondents Age 18 to 64 Without Health Insurance, Nashville, TN, BRFSS, 1996 and 1998



Data Sources

Metro Public Health
Department: BRFSS

men than women were uninsured (15% compared to 11%). No strong racial disparity was seen. When the respondents were stratified by age, respondents in the 18 to 24 age group had the largest proportion of uninsured (25%) (Figure 30). Fewer respondents were uninsured in the older age groups. Respondents with more education were less likely to be uninsured than those with limited education (Figure 31). Classifying the uninsured respondents by income, the majority were in the lower income brackets. Forty-seven percent (47%) of uninsured respondents said they made less than \$25,000 annually, while 27% earned between \$25,000 and \$49,999 (Figure 32).

Figure 30. Percentage of Respondents Age 18 to 64 Without Health Insurance by Age, Nashville, TN, BRFSS, 1996 and 1998

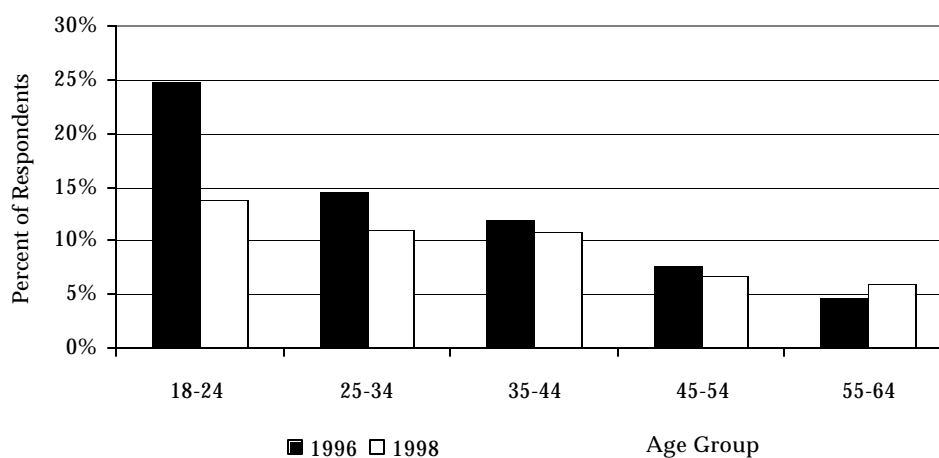


Figure 31. Percentage of Respondents Age 18 to 64 Without Health Insurance by Education, Nashville, TN, BRFSS, 1996 and 1998

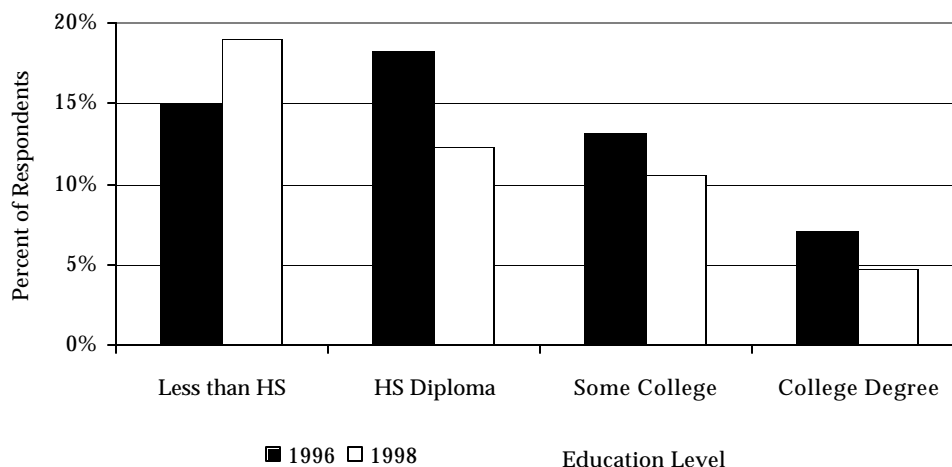
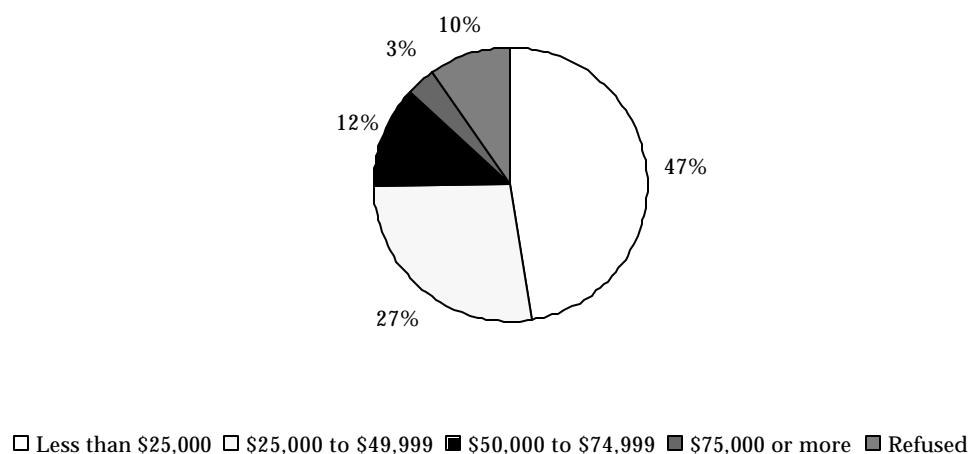


Figure 32. Percentage of Uninsured Respondents Age 18 to 64 by Income, Nashville, TN, BRFSS, 1996



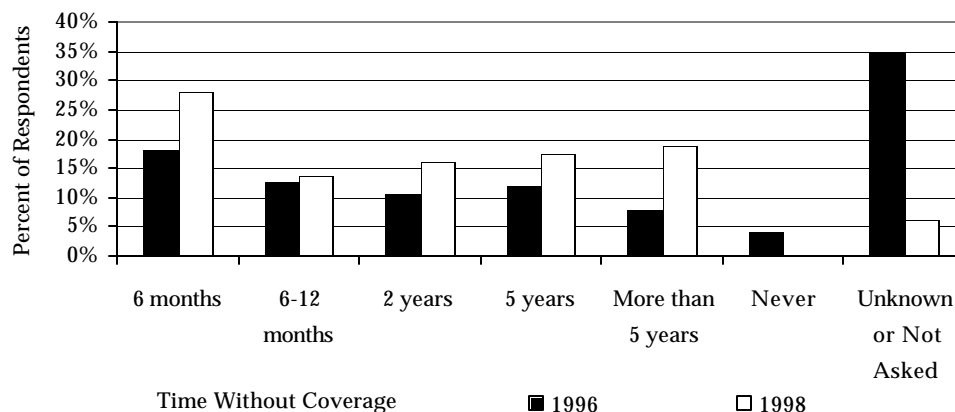
Overall in 2000, Nashville had a smaller proportion of uninsured BRFSS respondents than Tennessee or the U.S.

From 1996 to 1998, there was a drop in the overall proportion of uninsured nonelderly BRFSS respondents— in 1998 only 10% reported being without health insurance. All trends for gender, race, age, income, and time without insurance remained the same; however, the proportion of uninsured respondents who did not complete high school increased from 15% in 1996 to 19% in 1998.

When asked how long they had been without insurance, most nonelderly, uninsured respondents reported being without health insurance for less than 6 months – 18% in 1996 and 28% in 1998 (Figure 33). The difference in percentages from 1996 to 1998 may be an overestimate because fewer respondents were asked how long they had been without insurance in 1996 than in 1998. In 1996, additional questions were asked to probe whether a respondent might have secondary sources of health insurance which were overlooked when answering the initial question. As a result fewer respondents in 1996 were classified as truly being without health insurance. Probing for secondary insurance sources was not done in 1998.

The Tennessee and national BRFSS in 2000 included the same questions used in Nashville to assess health insurance coverage. Overall, Nashville had a smaller proportion of uninsured BRFSS respondents than Tennessee or the U.S. The percentage of uninsured adults (all ages) was age-adjusted to the U.S. 2000 standard population for comparison to the Tennessee and U.S. data. In 1998, the age-adjusted percentage of Nashville BRFSS respondents who did not have health insurance was 8%. Twelve percent (12%, age-adjusted) of Tennessee BRFSS respondents said they were uninsured and the median percentage for the U.S. (median percentage from 50 states, District of Columbia, and Puerto Rico) was also 12%. Nashville's trends for gender, age, and education were similar to those of Tennessee and the U.S. When considering racial disparities, Tennessee and the U.S. both show a bigger gap between white and black respondents than was seen in Nashville. The trend for income was similar, though, Nashville may have a higher proportion of uninsured residents in the \$25,000 to \$49,999 annual income bracket.

Figure 33. Percentage of Respondents Age 18 to 64 Without Insurance by Amount of Time Without Coverage, Nashville, TN, BRFSS, 1996 and 1998



Discussion

The effort to provide uninsured U.S. residents with adequate health care has been underway since the mid 1970s at both state and national levels.² New legislation such as the Health Insurance Portability and Accountability Act and the State Children's Health Insurance Program have made some inroads to offering care to the uninsured. Locally, MPHD, in cooperation with members from public and private medical institutions, hospitals, and clinics, is offering health care to uninsured residents through the Safety Net Consortium and the Bridges to Care Program. The Safety Net Consortium began in May 2000 with the goal of providing an appropriate level of care to uninsured residents. In February 2002, Bridges to Care was initiated to assist uninsured residents in establishing an ongoing primary care relationship with participating Safety Net clinics.

References:

- 1 United States Census Bureau. *Health Insurance Coverage: 2000*. September 2001.
- 2 Riley, T, Yondorf B. *Access for the Uninsured: Lessons from 25 Years of State Initiatives*. Portland, ME: National Academy for State Health Policy; January 2000.

The Safety Net Consortium began in May, 2000 with the goal of providing an appropriate level of care to uninsured residents.

Related Indicators

- Race/ethnic composition of population
- Population density

2.1.1.11 Non-English Speaking Population

Background

The ability to function in an English-language setting is important for an individual's survival, health, and well being in our community. An estimate of the size of the non-English speaking population can be used as an indicator of a community's cultural diversity. Non-English speaking populations may have demographic, social, economic, and health characteristics that differ from the English speaking population.¹ As Nashville's population becomes more diverse, information regarding the proportion of non-English speaking population in our community is very useful in planning, programming, and delivering health services to our culturally diverse population.

Data on the language spoken at home is obtained from the Census 2000 data and will serve as a proxy for the non-English speaking population since it is the data on the language spoken at home. No data is provided on the language spoken at work or school, with friends, etc.; therefore, the data should be used with caution since these data do not tell us the overall language habits of respondents.

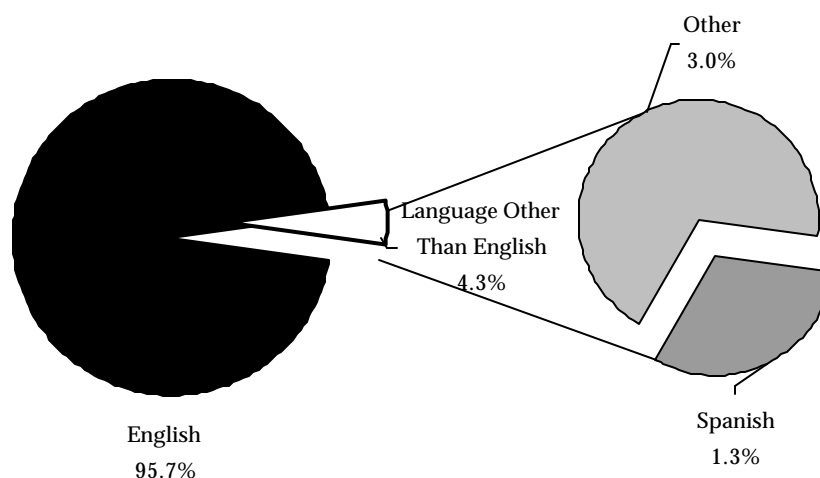
Additional Data

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Findings

From 1990 to 2000, the proportion of the population whose home language was not English increased from 4.3% of the population to 9.8% of the population, while English spoken at home decreased from 95.7% of the population to 90.2 % of the population. As displayed in figures 34 and 35, in 1990, less than one in twenty people spoke a language other than English at home. In 2000, almost one in ten people spoke a language other than English at home. The number of persons who spoke a language other than English at home increased remarkably from 1990 to 2000.

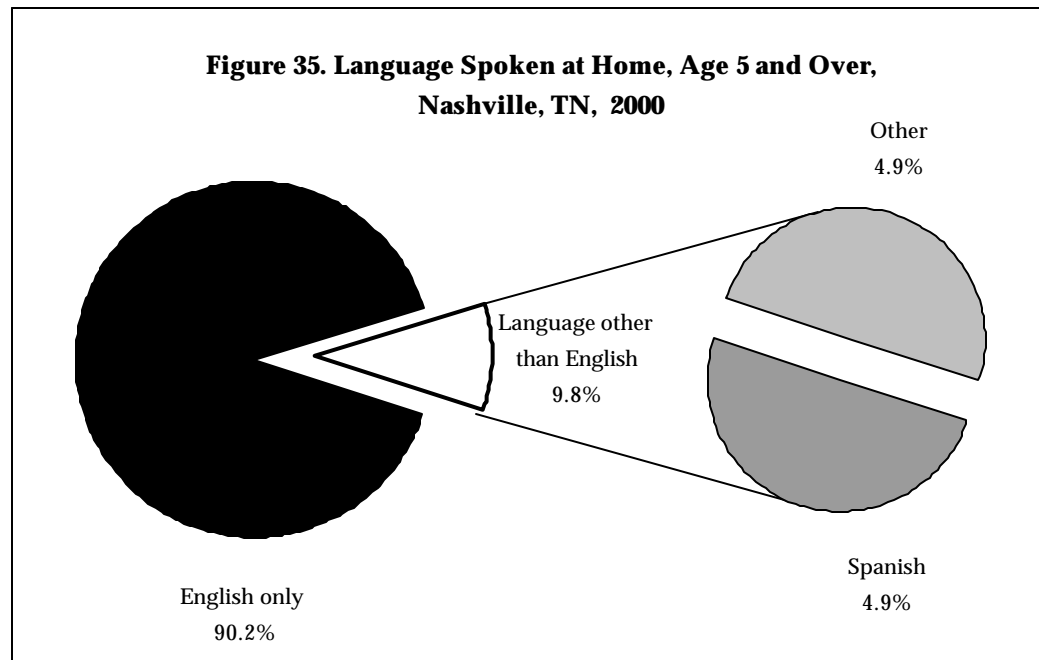
Figure 34. Language Spoken at Home, Age 5 and Over, Nashville, TN, 1990



Data Sources

U.S. Bureau of the Census

For those who spoke non-English at home, the Spanish-speaking population increased the most during the decade, from 1.3% of the Nashville population to 4.9% of the population.



Discussion

The growth of the non-English speaking population in our community highlights Nashville's diversity issue. The community's diversity affects every aspect of public health, from communicable disease control to maternal and child health issues. A culturally competent health care work force is needed in this community.

References :

1. Bernier L, Sauvageau Y, et al. *User's Guide to 40 Community Health Indicators*. Health and Welfare Canada; 1992.

The number of persons who spoke a language other than English at home increased remarkably from 1990 to 2000.

2.1.2 Physical Environment

A physical environment is typically defined as that which is experienced by the senses: sight, touch, taste, smell, and sound. However, the physical environment also contains less tangible elements, such as radiation and ozone. The physical environment can either harm or promote individual and community health. For example, toxic substances, irritants, infectious agents, and physical hazards in homes, schools, and worksites all have a detrimental effect on individual and community health. On the other hand, clean and safe places to work, exercise, and play promote good health in individuals and communities.¹

Reference:

1. U.S. Department of Health and Human Services. *Healthy People 2010* (Conference Edition, in Two Volumes). Washington, D.C.: January 2000.

The physical environment contains tangible elements which can be experienced through the senses of sight, touch, taste, smell, and sound and less tangible elements such as radiation and ozone.

Related Indicators

- Air quality
- Food protection in restaurants and retail food stores
- Public facilities

2.1.2.1 Drinking Water

Background

Clean, potable water is a hallmark to any decent standard of living. Most residents of Nashville use water supplied by the Metropolitan Government of Nashville and Davidson County 's Department of Water Services (Water Services). Other residents of Nashville receive water from a smaller utility that also services areas outside Nashville.

Findings

The source of water utilized by Water Services is the Cumberland River. The majority of Nashville lies in the Lower Cumberland – Sycamore watershed. The U.S. Environmental Protection Agency (EPA) rates the water quality of this watershed as a three on a six point scale. This rating indicates a watershed “where data suggest pollutants or other stresses are low, and, therefore there exists a lower potential for future declines in aquatic health. Actions to prevent declines in aquatic conditions in these watersheds are appropriate but at a lower priority than in watersheds with higher vulnerability.”¹ While it is not possible to completely eliminate all traces of contaminants, the EPA does establish maximum contaminant levels for substances that pose a health risk. In their most recent water quality study in 2001, Water Services reported that Nashville’s drinking water has contaminant levels below the maximum amount permitted by all state and federal standards and is safe to drink.² (Table 1)

According to Water Services, impurities that may be present in our source water include:

- Biological contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm run-off, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, storm water run-off, and residential uses.
- Organic chemicals, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water run-off, and septic systems.
- Radioactive materials, which can be naturally-occurring or are the result of mining activities or oil and gas production.³

At the Water Service treatment plants water from the river is first screened to remove large objects such as logs. Chemicals, known as coagulants, are added and mixed well. These chemicals do not stay in the water; instead, they cause contaminants such as mud and algae to cling to them forming larger particles. These settle to the bottom of the tanks and are removed mechanically. The water then flows slowly through settling tanks where larger particles are allowed to sink to the bottom. The water from these tanks is passed through filters made of gravel and sand. At this point the water is crystal clear, but before the water enters the distribution system, a small amount of both chlorine and fluoride are added. Chlorine must be added to prevent bacteria from developing. Fluoride is also added because it has been found to prevent tooth decay.⁴

Data Sources

Metropolitan Government
of Nashville and Davidson
County Department of
Water Services
Environmental Protection
Agency

Discussion

Drinking water, including bottled water, may contain at least small amounts of some contaminants. However, the presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline 1-800-426-4791.

**Table 1. Water Quality Parameters, Nashville,
TN, 2001**

Selected Parameters	Nashville	MCL
Arsenic	<.004	0.05
Cyanide	<.005	0.2
Lead	0.008	0.015
Nitrate	0.35	10

MCL = Maximum Contaminant Level established

by the Environmental Protection Agency

All results are milligrams per liter

Source: Metropolitan Government of Nashville and
Davidson County, Department of Water Services

References:

1. United States Environmental Protection Agency. Watershed health, lower cumberland-sycamore [online]. Available at: <http://www.epa.gov/iwi/hucs/05130202/score.html>. Accessed May 22, 2002.
2. Metropolitan Government of Nashville and Davidson County Department of Water Services. Water quality report [online]. Available at: <http://www.nashville.gov/water/qualityrpt.htm>. Accessed May 22, 2002.
3. Metropolitan Government of Nashville and Davidson County Department of Water Services. Nashville's water source [online]. Available at: <http://www.nashville.gov/water/source.htm>. Accessed May 22, 2002.
4. Metropolitan Government of Nashville and Davidson County Department of Water Services. The treatment process [online]. Available at: <http://www.nashville.gov/water/treatment.htm>. Accessed May 22, 2002.

Clean, potable water is a hallmark to any decent standard of living.

Related Indicators

Drinking water

2.1.2.2 Air Quality

Background

Exposure to air pollution is associated with numerous effects on human health, including respiratory problems, hospitalization for heart or lung diseases, and even premature death. Children are at greater risk because they are generally more active outdoors and their lungs are still developing. The elderly and people with heart or lung diseases are also more sensitive to some types of air pollution.¹

Air pollution, such as ground-level ozone, can significantly affect ecosystems. Ground level ozone causes reductions of agricultural and commercial forest yields and damages rubber products.¹

Findings

Air pollution comes from many different sources. These include: “stationary sources,” such as factories and power plants; smaller sources such as gas stations and painting operations; “mobile sources,” such as cars, buses, planes, trucks, and trains; and “natural sources,” such as windblown dust, wildfires and certain trees (Table 2).

Table 2. 2000 Nashville Annual Emission Inventory²

	Particulate*	Sulfur Oxides*	Nitrogen Oxides*	Carbon Monoxide*	Volatile Organic Compounds (VOC)*
Stationary Sources					
Transportation & Marketing of VOC	0.0	0.0	5.1	18.8	675.9
Industrial Processes	496.2	355.8	1672.0	3896.1	1675.2
Non-Industrial Surface Coating	0.0	0.0	0.0	0.0	1999.1
Other Solvent Use	0.0	0.0	0.0	0.0	3003.7
Miscellaneous Sources	21191.1	0.7	1.7	30.8	510.7
Fuel Combustion	477.0	8206.2	3063.4	2212.5	1249.9
Solid Waste Disposal	64.5	95.8	459.5	548.6	101.1
Total Stationary Sources	22228.7	8658.5	5201.6	6706.8	9215.6
Mobile Sources					
On-Road Mobile	1183.8	2583.2	18548.3	81265.0	8556.5
Non-Road Mobile	48.1	58.5	4824.9	34597.8	4475.1
Total Mobile Sources	1231.9	2641.7	23373.2	115862.8	13031.5
Total All Sources	23460.7	11300.2	28574.9	122569.5	22247.2

Data Sources

Metro Public Health
Department
Environmental Protec-
tion Agency
Tennessee Department
of Health

*All measurements are reported in tons per year.

The data presented in Table 2 is the calculated sum of the air pollution emissions in Davidson County, Tennessee for 2000. These values are neither high nor low, but represent the Pollution Control Division's best estimate of air emissions. Generally, the lower these values are, the lower the values are from our air quality measurement sites.

The Clean Air Act provides the principal framework for national, state, tribal, and local efforts to protect air quality. The Metropolitan Public Health Department's Pollution Control Division is responsible for carrying out these responsibilities in Davidson County. These responsibilities include monitoring for the six criteria pollutants for which National Ambient Air Quality Standards (NAAQS) have been set under the Clean Air Act and enforcing all air quality regulations.

Products of the Pollution Control Division include:

- Review of permit applications for potential air pollution sources;
- Preparation of an annual air pollution emissions inventory;
- Response to complaints from the public regarding both indoor and outdoor air quality;
- Provision of a daily report of Nashville's air quality to the public in the form of the Air Quality Index (AQI); and
- Participation with the Tennessee Air Pollution Control Division in providing a Middle Tennessee ozone forecast from May through September. (Tables 3 & 4)

Table 3. 2001 Air Quality Index Summary for Nashville, TN*³

Range	Number of Days	% of Total Days
Good	134	53%
Moderate	114	46%
Unhealthy for Sensitive Groups	3	1%

*Includes Davidson County only.

Table 4. 2001 Ozone Forecasting for Middle Tennessee³**

Category	# Days Forecast	# Days Observed
Good	77	91
Moderate	64	54
Unhealthy for Sensitive Groups	8	8
Unhealthy	0	0
Very Unhealthy	0	0

**Includes the Middle Tennessee counties of Cheatham, Davidson, Dickson, Robertson, Rutherford, Sumner, Williamson, and Wilson

Discussion

Currently, Nashville/Davidson County is in compliance with all National Ambient Air Quality Standards. Most likely, that will change in the near future. The Environmental Protection Agency (EPA) has proposed new, stricter standards for ozone and fine particulate matter.⁴ Instead of the current 1-hour average ozone standard of 0.12 ppm (parts per million), the ozone standard will become a stricter standard of 0.08 ppm averaged over eight hours. The fine particulate matter (PM_{2.5}) is a new standard. The new (PM_{2.5}) standard will be 65 micrograms per cubic meter averaged over 24 hours and 15 micrograms per cubic meter averaged over an entire year. Initial data indicates Nashville will not be in compliance with the stricter 8-hour ozone standard or the new annual average (PM_{2.5}) standard.

However, there are federal, state, and local initiatives underway that will reduce ozone precursors and particulate matter. There are programs at the federal level that require cleaner gasoline and diesel engines and the reduction of sulfur content in gasoline and diesel fuel. The NOx SIP (Nitrogen oxides/State Implementation Plan) call requires large fuel burning sources to better control emissions. There are local and state programs for enhanced automobile inspection and maintenance programs. There are ozone forecasting programs in place that advise residents when a high ozone day is expected so that plans can be adjusted to minimize health impacts and keep ozone levels at a minimum. All of the Tennessee local air programs, as well as the states of Arkansas, Tennessee, and Mississippi air programs, are involved in the Arkansas Tennessee Mississippi Ozone Study (ATMOS). ATMOS activities will result in a comprehensive evaluation of the status of the participating areas in relation to the 8-hour ozone standard. If compliance is not achieved by means of the current and proposed initiatives, ATMOS results will provide air pollution control strategies to bring Nashville and the participating areas into compliance with the 8-hour ozone standard.

References:

1. United States Environmental Protection Agency. Available at: <http://www.epa.gov/air/concerns>. Accessed June 6, 2002.
2. Metropolitan Health Department of Nashville and Davidson County, Tennessee. *2000 Annual Report*.
3. Metropolitan Nashville and Davidson County and Tennessee Department of Health Pollution Control Division. *Air Quality Index and Ozone Forecast Data, 2001*.
4. United States Environmental Protection Agency. Available at: <http://www.epa.gov/ttn/oarpg/naaqsfm/>. Accessed June 6, 2002.

Currently, Nashville and Davidson County is in compliance with all National Ambient Air Quality Standards.

Related Indicators

- Drinking water
- Solid and hazardous waste

2.1.2.3 Sewage

Background

For the safe and effective management of wastewater, our building codes mandate that all structures with plumbing facilities must be connected to a public sewer system or utilize an approved private on-site subsurface sewage disposal (septic) system.

Findings

According to the 1990 U.S. Census, of the 229,064 households in Nashville approximately 92% were connected to one of the public sewer utilities with service areas within Nashville. The remaining 8%, approximately 18,000 households, utilized a septic system. According to the records of MPHD's Division of Engineering Services, in fiscal year 2001, the Division inspected 135 new septic systems.

Discussion

Although the percentage of septic systems may seem marginal, they remain an active concern of MPHD. Much of the current development is occurring in outlying areas of the county where public sewer service is not available. Furthermore, the terrain and geology of the area make the proper installation of a septic system both difficult and critical. Contaminants introduced into our groundwater supply can spread quickly and reach underground aquifers and springs presenting health hazards to both public and private water supplies.

Most homes and businesses in Nashville that utilize public sewer connections are serviced by Metro's Department of Water Services. Water Services maintains three wastewater treatment plants that, in accordance with state and federal regulations, implement a series of sanitation techniques including filtering, settling, aeration, and chlorination. Treated wastewater from the three facilities is discharged into the Cumberland River.¹

Reference:

1. Metropolitan Government of Nashville and Davidson County Department of Water Services. Waste water treatment process [online]. Available at: <http://www.nashville.gov/water/h2otreatment.htm>. Accessed May 22, 2002.

Data Sources

Metropolitan
Government of Nashville
and Davidson County
Department of Water
Services

According to the 1990 U.S. Census, of the 229,064 households in Nashville approximately 92% were connected to one of the public sewer utilities with service areas within Nashville. The remaining 8%, approximately 18,000 households, utilized a septic system.

Related Indicators

Sewage

2.1.2.4 Solid & Hazardous Waste**Background**

Effective waste management is critical in our efforts to protect the environment and maintain a decent quality of life. The Public Works Department of the Metropolitan Government of Nashville and Davidson County (Public Works) oversees solid waste collection and maintains a household hazardous waste drop-off site. The Comprehensive Environmental Response Compensation and Liability Act (CERCLA) passed by the U.S. Congress in 1980 provides the U.S. Environmental Protection Agency (EPA) with the means to prioritize and clean up hazardous waste sites. The EPA maintains a National Priorities List (NPL) of the most hazardous sites. As of July 2002, there are no NPL sites in Nashville.¹

Findings

Most residents of Nashville live in the area designated as the Urban Services District for which weekly trash collection is provided at no charge. Other residents, living in the General Services District, must make arrangements with private firms for trash collection.

A new waste management plan has recently been approved by the Metropolitan Council. Previously, all solid waste was either transported to an out-of-county landfill or converted into energy at the Metropolitan Government's Thermal Transfer Plant. Under the new plan all solid waste will be transported to landfills outside of Nashville, and the Thermal Transfer Plant was scheduled for retirement. Due to an accidental fire in the spring of 2002, the Thermal Transfer Plant was shut down ahead of schedule.

Discussion

Public Works also manages a hazardous waste collection center where citizens are encouraged to dispose of items such as paint, pesticides, batteries, and cleaning agents. For residents of the Urban Services District, monthly curbside recycling is being implemented as part of the new waste management plan. Citizens are encouraged to deposit recyclable waste that is not collected as part of the curbside recycling plan at one of many collection centers managed by Public Works. Please contact Public Works for the locations and hours of operation for these sites. Public Works can be reached at 615-880-1000 or on the internet at <http://www.nashville.gov/pw/index.htm>.

Reference:

1. United States Environmental Protection Agency: Superfund. Available at: <http://www.epa.gov/superfund>. Accessed July 16, 2002.

Data Sources

Metropolitan Government
of Nashville and Davidson
County Public Works
Department
Environmental Protection
Agency

Effective waste management is critical in our efforts to protect the environment and maintain a decent quality of life.

Most residents of Nashville live in the area designated as the Urban Services District for which weekly trash collection is provided at no charge.

Related Indicators

Health status and quality of life

2.1.2.5 Lead Poisoning

Background

Lead poisoning is an environmental health hazard for which young children are especially susceptible. A leading source of exposure to lead is through lead-based house paint. Prior to its banning in 1978, lead-based paint was widely used in residential construction and renovation. More than 80 percent of homes built before 1980 contain lead paint.¹ Residents of these older homes are threatened by chipping or peeling lead paint, or excessive amounts of lead-contaminated dust. Children are especially at risk because they are more likely to eat lead-based paint chips and place objects covered with lead dust in their mouths. Other sources of lead include contaminated soil, water from older, lead pipe plumbing systems, folk remedies containing lead, and hobbies and industries that utilize lead.

Even at low levels, lead poisoning in children can cause IQ deficiencies, reading and learning disabilities, impaired hearing, reduced attention spans, hyperactivity, and other behavior problems. Pregnant women poisoned by lead can transfer lead to a developing fetus, resulting in adverse developmental effects.² The younger the child is at the time of exposure the greater the harmful effects of lead poisoning. While the damage resulting from lead poisoning cannot be undone it can be prevented. A blood test is the only way to know if a child is being exposed. This test can be done as early as six months of age.

Findings

The MPH's Division of Environmental Sanitation conducts environmental assessments that test for lead. These assessments are generally conducted if a physician or clinic detects a high lead level in a patient's blood. According to records of the Division of Environmental Sanitation for fiscal year 2000, 15 such assessments were conducted by the Division.

Discussion

Despite being banned in 1978, lead-based paint remains a significant concern. Many neighborhoods in Nashville consist of homes that were built when lead-based paint use was common. Precautions should be taken when living in or renovating a home that may have lead-based paint. For additional information pertaining to environmental assessments for lead and renovating homes that contain lead-based paint contact the Division of Environmental Sanitation at 615-340-5644.

References:

1. United States Environmental Protection Agency. Prevention, pesticides, and toxic substances: lead in your home: a parent's reference guide [online]. EPA 747-B-98-002. June 1998. Available at: <http://www.epa.gov/lead/leadpbed.htm>. Accessed May 23, 2002.
2. United States Environmental Protection Agency. Lead and compounds [online]. Available at: <http://www.epa.gov/ttn/atw/hlthef/lead.html>. Accessed May 23, 2002.

Data Sources

Metro Public Health
Department
Environmental Protection
Agency

Even at low levels, lead poisoning in children can cause IQ deficiencies, reading and learning disabilities, impaired hearing, reduced attention spans, hyperactivity, and other behavior problems.

Related Indicators

Notifiable diseases
affecting the
gastrointestinal tract

2.1.2.6 Food Protection in Restaurants and Retail Food Stores

Background

Foodborne illness presents a significant threat to the health of the public. While the specific causes of foodborne illness vary, they generally result from improper food handling and meal preparation techniques. Without proper food protection procedures the chances for the introduction of disease-causing bacteria and viruses into the food supply increases considerably. Examples of foodborne pathogens include *campylobacter jejuni*, *clostridium botulinum*, *Escherichia coli* 0157:H7 (E. coli), Norwalk-like virus, and hepatitis A. Symptoms range from mild to severe and can include nausea, vomiting, diarrhea, and fever as well as difficulties with vision, breathing, and speaking. These symptoms may appear less than an hour after ingestion of the pathogen or after several days. In extreme cases, a foodborne illness may result in death.¹

MPHD's Food Protection Division provides protection from the threat of foodborne illness by conducting inspections among Nashville's food service establishments (restaurants, snack bars, and school cafeterias) and retail food stores (groceries or markets).

Findings

According to the Food Protection Division's records for fiscal year 2001, 12,500 inspections were conducted. Currently, there are approximately 2,750 food service establishments and 750 retail food stores with food permits within Nashville. The Division conducts unannounced food inspections at least twice each year among these food establishments. The Division uses a FDA-approved, standardized 44-point food service establishment inspection process. MPHD also provides basic food protection training; a training program targeted at high school students due to their likelihood to seek employment in a restaurant; a program targeted to churches, clubs, and civic groups; and a program that fosters self-inspection procedures for restaurant managers. (See Section 3.4.1.1 for additional information pertaining to diseases that may be foodborne.)

Discussion

Because the quality of the food we eat has a direct impact on our health, the Food Protection Division is constantly working with the markets and restaurants of Nashville to ensure the proper food preparation and storage. Citizens with concerns regarding food preparation techniques or with a particular restaurant or market should not hesitate to contact the MPHD's Food Protection Division at 615-340-5620.

Reference:

1. U.S. Food and Drug Administration. The unwelcome dinner guest: preventing foodborne illnesses [online]. Available at: <http://www.cfsan.fda.gov/~dms/fdunwelc.html>. Accessed May 23, 2002.

Data Sources

Metro Public Health
Department
U.S. Food and Drug
Administration

The quality of the food we eat has a direct impact on our health.

Related Indicators

Drinking water

2.1.2.7 Public Facilities

Background

Nashville’s residents and visitors expect clean and safe facilities and accommodations. MPHD’s Division of Public Facilities conducts environmental health and safety inspections of public swimming pools, hotels and motels, day care centers, schools, correctional facilities, and tattoo parlors located in Nashville. The program responds to complaints pertaining to these establishments to ensure the continued health and safety of the public.

Findings

According to the Public Facilities Division’s records for fiscal year 2000, the Public Facilities Division made 5,188 swimming pool inspections with 158 of those resulting in a pool closing until the violation could be corrected. In that same time period there were 638 hotel inspections and 731 child care facility inspections.

Discussion

The selection of a day care facility or a hotel should be based in part on its sanitary condition. The MPHD’s Public Facilities Division maintains inspection records on these facilities and others throughout Nashville. The Public Facilities Division may be reached at 615-340-5630.

Data Sources

Metro Public Health
Department

For fiscal year 2000, the Public Facilities Division made 5,188 swimming pool inspections with 158 of those resulting in a pool closing until the violation could be corrected. In that same time period there were 638 hotel inspections and 731 child care facility inspections.

2.2 Lifestyle and Behavioral Risk Factors

Diseases, conditions, and injuries responsible for most of the premature death and disability in the United States could be substantially reduced through lifestyle and behavioral modifications.¹ In response to the emerging evidence for the association between lifestyle and behavior and risk for disease and injury, the CDC established the Behavioral Risk Factor Surveillance System (BRFSS) in 1984.² The BRFSS is designed to estimate the prevalence of many health risk behaviors at the state and national level. MPHD conducts a similar BRFSS to assess the health risk factors that exist in Nashville. In the following section, we will examine behavioral risk factors that predispose Nashville residents to many of the leading causes of death – heart disease, stroke, cancer, and accidents. These four causes of death accounted for 63% of the deaths in Nashville in 2000, and robbed 28,000 years of life from our residents as a result of premature death.

References:

1. Bauer KC. *Improving the Chances for Health: Lifestyle Change and Health Evaluation*. San Francisco, CA: National Center for Health Education; 1980.
2. Centers for Disease Control and Prevention. Description of the behavioral risk factor surveillance system. Available at: <http://www.cdc.gov/brfss/about.htm>. Accessed June 3, 2002.

Behavioral risk factors predispose Nashville residents to many of the leading causes of death including heart disease, stroke, cancer, and accidents, which accounted for 63% of the deaths in Nashville in 2000 and robbed 28,000 years of life from our residents as a result of premature death.

2.2.1 Physical Activity

Related Indicators

- Overweight and obesity
- Unhealthy days
- Activity limitation days
- Leading causes of death

Background

The 1996 report of the U.S. Surgeon General on physical activity and health summarizes scientific research supporting the basic fact that regular physical activity can improve and maintain general health and quality of life for persons of all ages. The list of specific medical conditions which might be attenuated by increased levels of physical activity includes certain cancers, osteoporosis, arthritis, heart disease, diabetes, hypertension, and disability. Increased physical activity is also associated with longer life.¹

In 1995, a joint recommendation was made by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine for each person to engage in moderate physical activity on all or most days of the week, for at least 30 minutes a session.² Moderate activity is considered to be any activity that uses large muscle groups and is at least equivalent to brisk walking.³ The Healthy People 2010 objective most closely related to this recommendation is Objective 22-2. – “increase the proportion of adults who engage regularly/daily in moderate physical activity for at least 30 minutes per day to 30%”.³ Without a measure of exertion and without knowing the type of activity (walking, swimming, etc.), we cannot determine if respondents to the Nashville BRFSS did *moderate* physical activity, but we can estimate how many were active, in some manner, for the recommended duration and frequency.

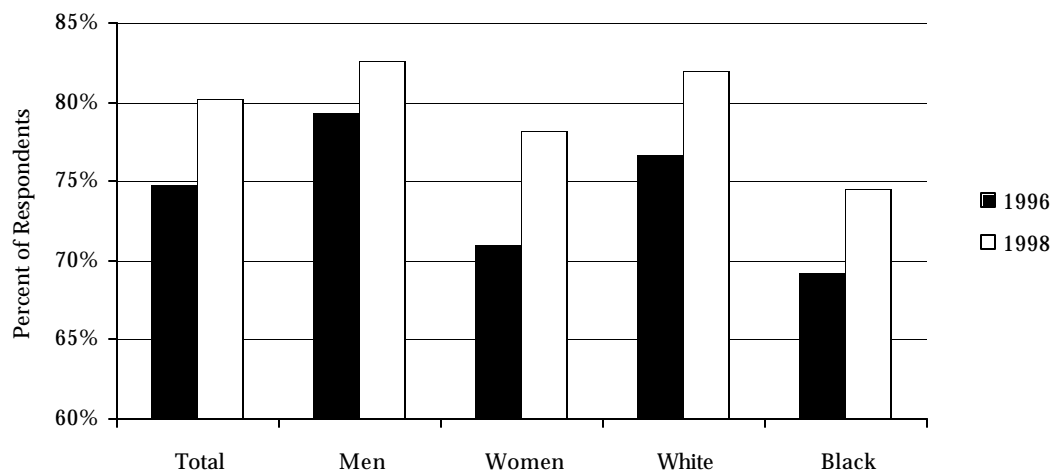
Additional Data

Appendices
pages D-30 - D-31

Findings

Overall, a large percentage of respondents to the BRFSS said they are physically active – 75% in 1996 and 80% in 1998 (Figure 36). In both years, more men than women and more whites than blacks reported being active. Physical activity was more commonly reported in persons in the younger age groups (Figure 37). A smaller proportion of respondents with a high school diploma or less education reported being physically active than college

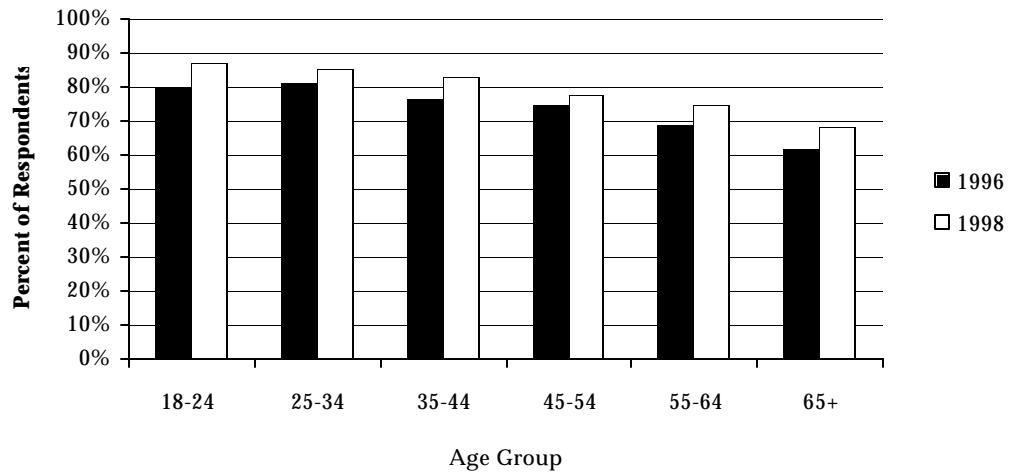
Figure 36. Respondents Who Were Physically Active in the Prior Month, BRFSS, Nashville, TN, 1996 and 1998



Data Sources

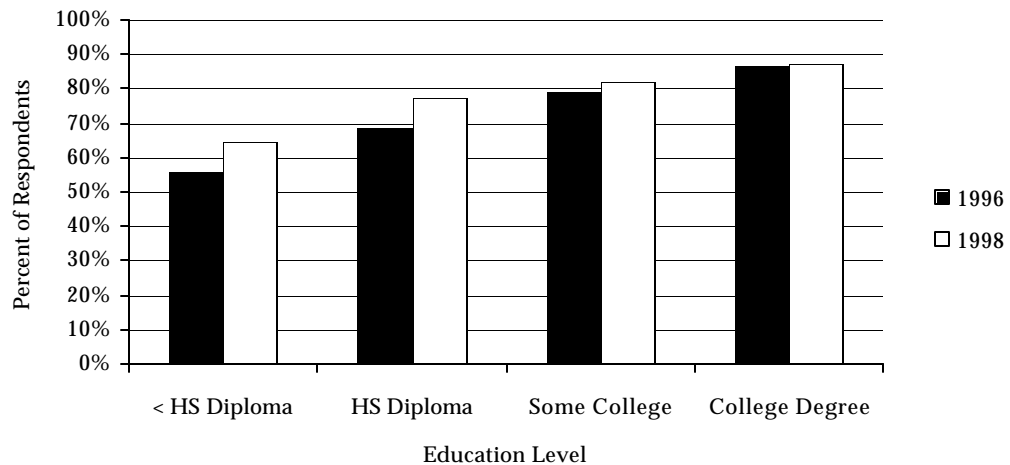
Metro Public Health
Department: BRFSS

Figure 37. Respondents Who Were Physically Active in the Prior Month by Age Group, BRFSS, Nashville, TN, 1996 and 1998



Overall, a large percentage of respondents to the BRFSS said they are physically active.

Figure 38. Respondents Who Were Physically Active in the Prior Month by Education Level, BRFSS, Nashville, TN, 1996 and 1998



graduates (Figure 38). The general trend from 1996 to 1998 was a small increase in reported physical activity for all gender, race, age, and education-level groups.

When we consider frequency and duration of each physical activity session, less than one quarter of respondents were physically active at the level recommended by the Surgeon General's report. In 1996, 24% of respondents were active for at least 30 minutes on five days per week. In 1998, 17% of respondents reported their five times per week activity lasted at least 30 minutes each time. Considering a less stringent schedule of being active three times per week or more, in 1996, 58% of respondents

Compared to both Tennessee and the nation, Nashville appears to have more physically active people.

maintained the activity for 30 minutes or more, three times a week. In 1998, 34% of the respondents who said they were physically active in the last month did activity at least three times a week and for at least 30 minutes at each activity session.

Compared to both Tennessee and the nation, Nashville appears to have more physically active people (Table 5). In 1998, the percent of physically active persons was 16 points higher in Nashville than in the state and 8 points higher than in the U.S. Even when duration and frequency of activity are considered, Nashville residents are still doing slightly better than the U.S., but have not reached the Healthy People 2010 target. The age-adjusted proportion of Nashville BRFSS respondents who were active for 30 minutes, 5 times a week, was 25% in 1996 and 17% in 1998. From National Health Interview Survey data used to calculate the baseline estimates for Healthy People 2010 objectives, the estimated proportion of U.S. adults who also met this criteria was only 15% in 1997.

Table 5. Age-adjusted* Rates of BRFSS Respondents Who Reported Being Physically Active in the Month Prior to Survey, Nashville 1996 and 1998, TN 1998, and U.S. 1998

	Nashville, TN 1996	Nashville, TN 1998	Tennessee 1998	U.S. 1998
Total	74%	80%	64%	72%
Men	79%	82%	67%	74%
Women	71%	78%	62%	70%
White	76%	82%	65%	74%
Black	68%	72%	61%	66%

* Adjusted to the U.S. 2000 standard population.

Discussion

While all people in Nashville would benefit from being physically active, the results presented here suggest that women, blacks, and persons in older age groups are most in need of physical activity promotion initiatives. We must note that the estimates of physical activity in this chapter are very likely overestimates because they are based on self-reported data. Furthermore, the trends we noticed may also be biased by differences in the BRFSS questionnaires from 1996 to 1998. For instance, the reduction in the percentages from 1996 to 1998 may be due to the lack of detail in the 1998 survey questions. In 1996, the respondents were first asked about the specific activity in which they engaged (e.g. walking, swimming, gardening, etc.) and then asked about frequency and duration of that activity. In 1998, they were not asked what type of activity they did. Without asking for the type of activity, the respondent may be biased in their reporting of frequency and duration because a frame of reference is not set, as would be if they reported that they jogged or swam three times a week.

There are two community-based programs associated with MPHD that promote better health through physical activity – REACH 2010 and Walk Nashville. REACH 2010 is a CDC funded program. Its main focus is to reduce cardiovascular disease and diabetes in the North Nashville community, a community which is predominantly black and has high rates of these and related conditions. REACH 2010's strategic plan includes physical activity as one modifiable risk factor and has organized a team to address this issue. The team works to create readiness to change in the community, develop a behavioral support

system, and remove environmental barriers to walking and exercise. Walk Nashville is a city-wide joint project of the Community Health and Wellness Team facilitated by MPH. It targets residents of all ages through various physical activity promoting events. Walk Nashville also seeks to identify and remove environmental barriers to walking such as sidewalks.

References:

1. U.S. Department of Health and Human Services. *Physical Activity and Health. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.
2. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard, C, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Journal of the American Medical Association*. 1995;273:402-407.
3. U.S. Department of Health and Human Services. *Healthy People 2010* (Conference Edition, in Two Volumes). Washington, D.C.: January 2000.

While all people in Nashville would benefit from being physically active, the results presented here suggest that women, blacks, and persons in older age groups are most in need of physical activity promotion initiatives.

Related Indicators

- Physical activity
- Unhealthy days
- Leading causes of death
- Cancer incidence

2.2.2 Overweight and Obesity

Background

The prevalence of overweight and obesity is steadily increasing in Tennessee and the United States. In 1999, approximately 52.5% of Tennesseans were overweight or obese according to a 3-year average of Tennessee BRFSS data. This was a 2.1 point increase from the 1998 estimate of 50.4%.¹ The most recent estimate of the overweight population in the United States was 61% in the 1999 National Health and Nutrition Examination Survey (NHANES), a 5 point increase from 56 in 1994.² The growing rate of obesity is reflected in many of the health problems faced by Nashville's residents. Obesity is a major risk factor for heart disease, non-insulin dependent diabetes, and some cancers. A recent national study on obesity estimated that 69% of diabetes and 40% of heart disease are attributable to obesity³, consuming 5% of the total health care costs in the United States, or \$53 billion (1995 dollars). Heart disease is the most common cause of death in Nashville (see Section 3.3). Cancer ranks 2nd and diabetes 8th. Nashville must closely monitor the rate of obesity in its residents not only to guide prevention, but prepare for resident's health needs.

Additional Data

Appendices
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The criteria for defining overweight and obesity are based on the National Institutes of Health and World Health Organization classifications of body mass index. The body mass index (BMI) is calculated from body weight and height ($\text{BMI} = \text{weight in kilograms}/(\text{height in meters})^2$). Overweight is classified as BMI greater than 24.9 kg/m^2 and obesity is classified as BMI greater than 29.9 kg/m^2 .⁴ The Healthy People 2010 goal (Objective 19.1) for increasing the proportion of adults who are at a healthy weight ($\text{BMI} \geq 18.5$ and < 25) sets the goal at 60% of adults aged 20 years and older in the United States, or, rather, only 40% of adults should be overweight by 2010. Objective 19.2 targets the obese proportion of the population, with the goal to reduce this percentage to just 15% of the adult (over age 20) population.⁵ The best measure of determining overweight is actual measurement of body weight and height. In Nashville, we do not have a public source of information containing such actual measures. However, from the Behavioral Risk Factor Surveillance Survey (BRFSS) we can estimate the prevalence of overweight and obesity.

Findings

Figure 39 shows the percentage of Nashville adult residents (age 18 and older) who were classified as overweight, according to data collected by telephone surveys conducted for the BRFSS in 1996 and 1998. In the total population, 49% of adult residents were estimated to be overweight or obese in 1996 and 53% in 1998. More men than women were estimated to be overweight, as were more black residents than white. When the population is stratified into age groups (Figure 40), we see that the prevalence of overweight is greater in the older age groups – in 1998, only 39% of the 18-24 age group were overweight, while 63% of the 55-64 age group were. And when splitting the population by level of education (Figure 41), a smaller proportion of residents with a college education was overweight compared to those with less than a high school diploma. The general trend from 1996 to 1998 was an overall increase in overweight and obesity in Nashville.

Data Sources

Metro Public Health
Department: BRFSS

A similar proportion of the Nashville population is overweight compared to the Tennessee and U.S populations (Table 6). Nashville followed the same trend as the state in that more blacks were overweight than whites and more men were estimated to be overweight than women.

Figure 39. Overweight per Body Mass Index, BRFSS, Nashville, TN, 1996 and 1998

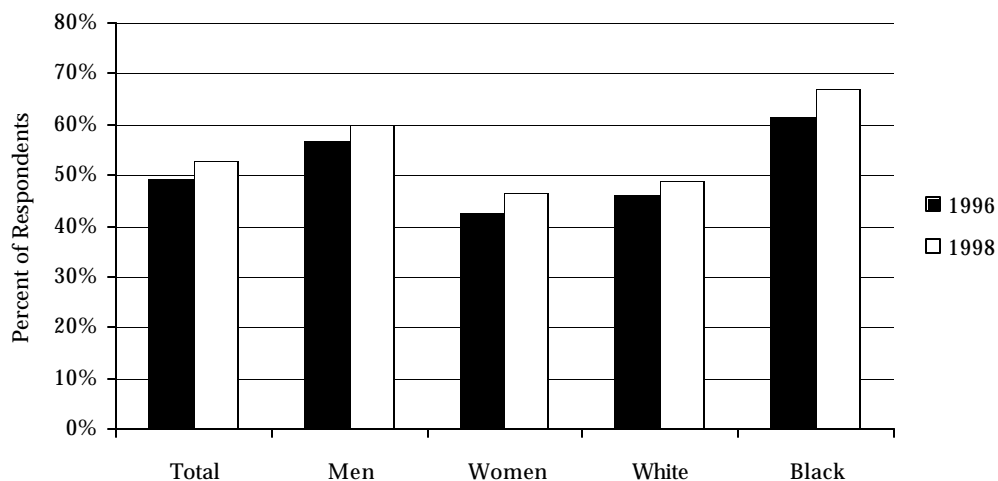
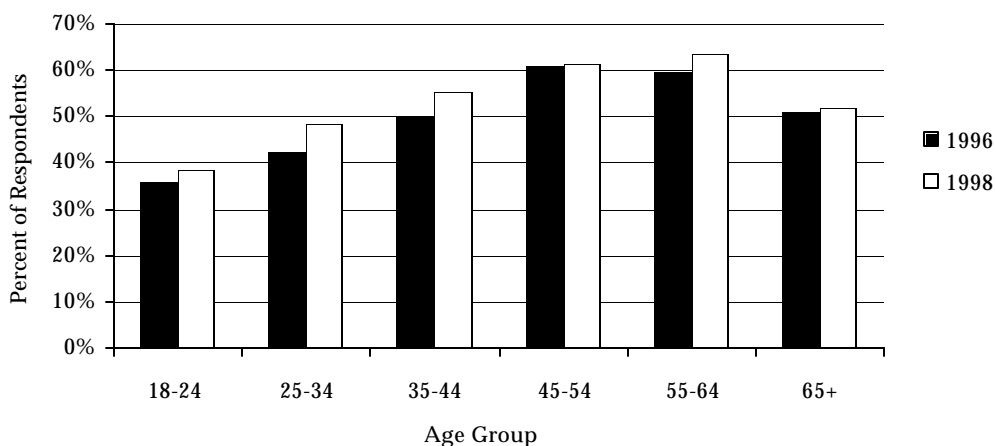
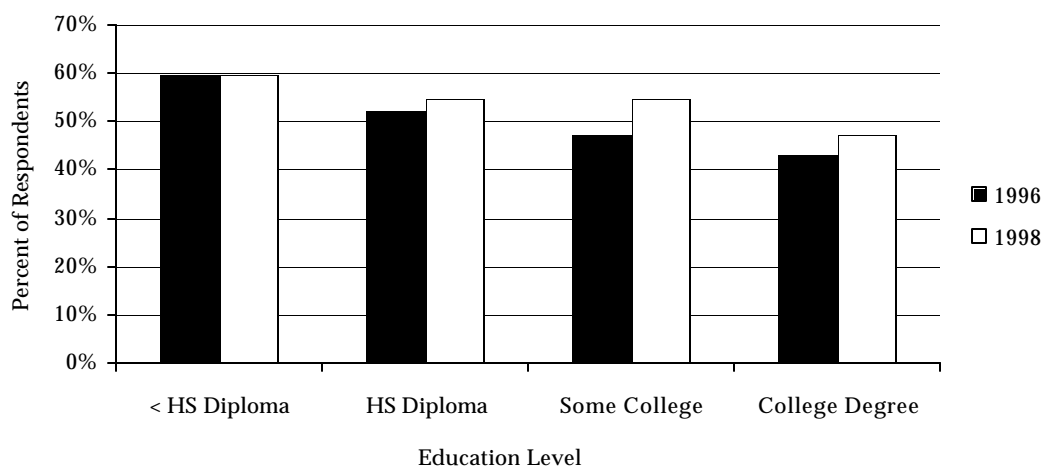


Figure 40. Overweight per Body Mass Index, by Age Group, BRFSS, Nashville, TN, 1996 and 1998



In Nashville, 49% of adult residents were estimated to be overweight or obese in 1996 and 53% in 1998.

Figure 41. Overweight per Body Mass Index, by Education Level, BRFSS, Nashville, TN, 1996 and 1998



The true proportion of the Nashville adult population that is overweight and obese is likely to be higher than the estimates reported here.

Table 6. Age-adjusted¹ Rates of Adult Overweight, Nashville 1998, Tennessee 1996, and U.S. 1999

	U.S. NHANES 1999	TN BRFSS 1996-1998 ²	Nashville BRFSS 1998
Total	61%	50%	53%
Male	^	59%	60%
Female	^	43%	47%
White	^	49%	49%
Black	^	59%	68%

¹Percentages were age-adjusted to the U.S. 2000 Standard Population.

²Data source: National Center for Health Statistics; available at

<http://www.cdc.gov/nchs/statestatsbysexrace.htm>. Accessed on August 23, 2001.

^Data not available

Discussion

While overweight appears to be less common in Nashville than in the U.S., our mortality rates emphasize that obesity and overweight are significant problems in our community. The 2000 mortality statistics show that diabetes, heart disease, stroke, and cancer consistently rank in the top 10 leading causes of death for all race, gender, and adult age groups. Also, research shows that any rates calculated from self-reported data must be considered underestimates, especially in older adults⁶, so the true proportion of the Nashville adult population that is overweight and obese is likely to be higher than the estimates reported here.

Overweight was most prevalent in adults between the ages of 45 - 64 and blacks.

What groups are most in need of intervention or are at highest risk for obesity-related health problems? According to our estimates from the 1998 BRFSS, overweight was most prevalent in adults between the ages of 45-64 and blacks. Blacks were three times more likely to be overweight than the rest of the population. Persons between the ages of 45 and 54 were 34% more likely to be overweight than persons in the other age groups combined and persons between 55 and 64 were 53% more likely to be overweight than the other age groups combined. Obesity reduction campaigns should be targeted to these groups.

Metro Health Department already has two programs that indirectly deal with overweight by targeting associated risk factors and chronic conditions. The Division of Health Promotion's "Walk Nashville Week" is conducted in cooperation with the Community Health and Wellness Team, a community-based volunteer organization. Walk Nashville Week has several activities each year that promote walking in all age groups – grade-school children, sports fans, and the elderly. The Chronic Disease Intervention Program monitors the condition of residents with diabetes and/or hypertension through a case-management plan. Home-visiting nurses and a certified diabetes educator work with patients to improve their understanding of the disease, maximize their utilization of health care options, and teach them how self-management strategies like diet, glucose monitoring, and physical activity can improve their condition.

In the near future, better data will be available to assess overweight and obesity in Nashville. The year 2000 BRFSS concentrates on many high risk council districts and population sub-groups. Also a much larger sample of the community was surveyed than in past years. Data will also be available for a representative sample of 200 Nashville residents who participated in the NHANES 2000. NHANES 2000 will provide several clinic measures on the participants, including height and weight. These sources should allow us to make a better estimation of the true prevalence of overweight in our county.

References

1. Centers for Disease Control and Prevention, National Center for Health Statistics. Health behavior and risk factor data questions [online]. Available at: <http://www.cdc.gov/nchs/datawh/statb/hbrfdes.htm#bmi>. Accessed August 23, 2001.
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6. Kuczmarski MF, Kuczmarski RJ, Najjar M. Effects of age on validity of self-reported height, weight, and body mass index: findings from the Third National Health and Nutrition Examination Survey, 1988-1994. *Journal of the American Dietetic Association*. 2001;101(1):28-34.

Related Indicators

- Air quality
- Environmental tobacco smoke
- Infant mortality
- Leading causes of death
- Cancer incidence
- Economic dimension of health problems

2.2.3 Tobacco Use – Smoking

Background

In 1957, the U.S. Public Health Service declared that “excessive smoking is one of the causative factors of lung cancer.”¹ A few years later the Surgeon General gave more complete evidence of this in the 1964 report on “Reducing the Health Consequences of Smoking”.¹ In the following four decades, the public health and medical communities have learned a great deal more about how smoking harms health. The Centers for Disease Control and Prevention estimate that 1 in 5 deaths in the U.S. is smoking related.² Smoking is known to increase risk of death from several kinds of cancer (especially lung), respiratory conditions, cerebrovascular disease (stroke), and heart disease. Essentially, smoking is the number one preventable cause of death and disease in the U.S.³

Healthy People 2010 provides multiple objectives related to tobacco use. Objective 27-1 is aimed at reducing all forms of tobacco use by adults aged 18 years and older. The tobacco smoking goal is to reduce the percentage of adults who smoke to 12% of the population by 2010. Objective 27-5 focuses on smoking cessation attempts. The goal is for 75% of adults who smoke to have attempted smoking cessation by the year 2010.⁴

To estimate the percent of Nashville residents who smoke, we used data from the 1996 and 1998 BRFSSs. Respondents who reported smoking everyday or some days in the last 30 days were classified as “current smokers”.

Findings

In 1996, 28% of BRFSS respondents could be classified as smokers. In 1998, the percentage dropped slightly to 27% (Figure 42). In both years, more men than women reported smoking. The gap between men and women was small, but it widened slightly in 1998 to

Additional Data

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Data Sources

Metro Public Health
Department: BRFSS

Figure 42. Percent of Respondents Who Were Smokers, Nashville, TN, BRFSS, 1996 and 1998

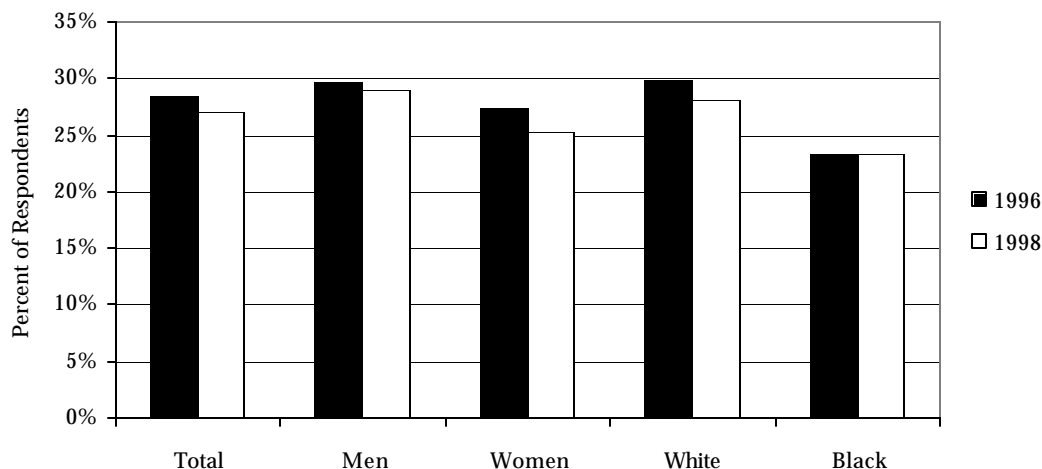
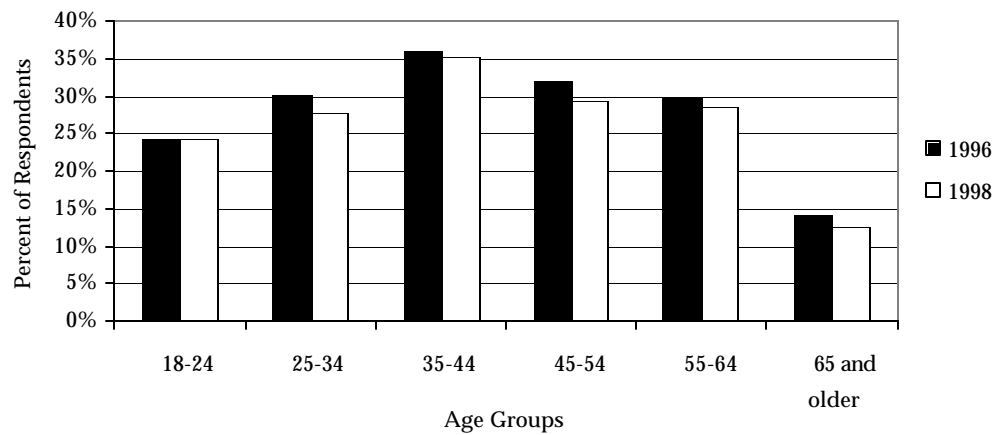


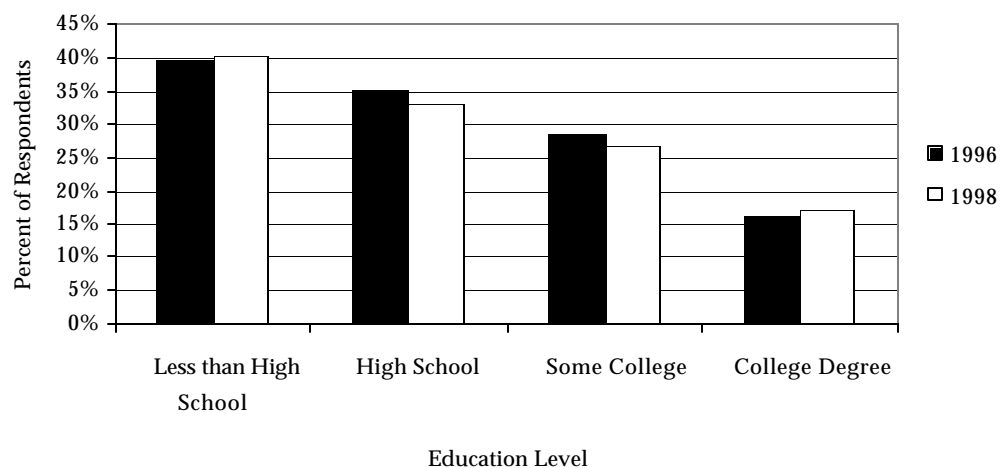
Figure 43. Percent of Respondents Who Were Smokers by Age Groups, Nashville, TN, BRFSS, 1996 and 1998



In Nashville, more than 1 in 4 BRFSS respondents were smokers, and more men than women reported smoking.

29% of men and 25% of women. More whites than blacks were smokers, with approximately 5% fewer blacks being smokers than whites. The percent of respondents who reported smoking was largest in the 35-44 years age group (Figure 43). There was an inverse relationship between smoking and education, with approximately 40% of respondents with less than a high school diploma being smokers, while approximately 17% of college graduates were smokers (Figure 44). The gender, race, age, and education trends in Nashville are all similar to the trends in Tennessee and the U.S.

Figure 44. Percent of Respondents Who Were Smokers by Education Level, Nashville, TN, BRFSS, 1996 and 1998



Overall, Nashville had a higher proportion of smokers in its population than did Tennessee or the U.S.

To directly compare Nashville to Tennessee and the U.S., percentages were age-adjusted to the U.S. 2000 standard population (Table 7). Overall, Nashville had a higher proportion of smokers in its population than did Tennessee or the U.S. The difference between percent of men who smoke and percent of women who smoke was smaller in Nashville than in Tennessee or the U.S. When comparing race, the gap between white and black smokers was smaller in Nashville than in Tennessee, but wider compared to the U.S. rates.

Table 7. Age-adjusted Percentages of Respondents Who Report that They Are Current Smokers, Nashville 1996 and 1998, Tennessee 2000, and U.S. 2000

	Nashville BRFSS 1996	Nashville BRFSS 1998	Tennessee BRFSS 2000	U. S. BRFSS 2000*
Total	28%	27%	26%	23%
Men	29%	28%	28%	24%
Women	28%	25%	24%	21%
White	30%	28%	27%	23%
Black	25%	25%	20%	23%

*Median data from year 2000 BRFSS

Discussion

Tobacco use from smoking in Nashville appears to be equally common in all gender and racial subpopulations. We expect that these estimates of smokers in Nashville are likely to be underestimates. As it has become public knowledge that smoking harms your health, smokers may be less likely to report their habit on a survey. Therefore, it is even more important that the whole of Nashville be the focus of tobacco use reduction. Several educational campaigns and tobacco use initiation prevention programs that appeal to everyone in Nashville are ongoing. Many of these programs are organized by the Smoke-Free Nashville Coalition, a community-based initiative which is facilitated by MPH. Nashville-based educational campaigns tied to national events include Kick-Butts Day and World No Tobacco Day. Smoke-Free Nashville does not provide individual-based cessation counseling, but does offer a comprehensive resources guide of local cessation programs. Prevention programs focused on the adolescent population include no-smoking poster contests and a rewards program for retailers to educate them on the laws against selling tobacco to under-age persons. The Coalition also strives to educate political leaders on the health hazards of smoking, thereby promoting policy change to increase the excise tax on cigarettes and create more smoke-free places.

The National Academy of Medicine has begun an initiative to remove tobacco products from pharmacies as they believe that health products and products that cause ill health and death should not be sold together.

References:

1. U.S. Department of Health, Education, and Welfare. Public Health Service. *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*. Washington, D.C.: 1964.
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4. U.S. Department of Health and Human Services. *Healthy People 2010* (Conference Edition, in Two Volumes). Washington, D.C.: January 2000.

Related Indicators

- Air quality
- Tobacco use - smoking
- Infant mortality
- Leading causes of death
- Cancer incidence
- Economic dimension of health problems

Additional Data

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Data Sources

Metro Public Health
Department: BRFSS

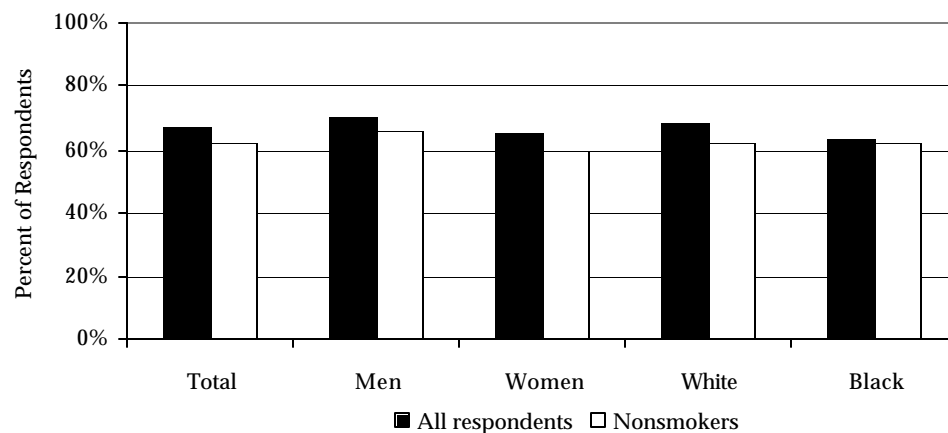
2.2.4 Environmental Tobacco Smoke

Background

Tobacco smoke contains at least 43 chemicals that are documented to cause cancer in humans.¹ These chemicals are obviously dangerous to the smoker, but they also put nonsmokers who are exposed to environmental tobacco smoke (second-hand smoke) at risk. Health problems linked with exposure to environmental tobacco smoke (ETS) include lung cancer, asthma, and heart disease in adults and respiratory infections, low birth weight, and sudden infant death syndrome in children.^{1,2} There are some safe-havens for the nonsmoker – many public places like airports, shopping malls, and office buildings are designated smoke-free. However, significant exposure can still occur in the home, restaurants, and other public places. For children, exposure to ETS is most likely to occur at home. One study estimates that 43% of U.S. children are exposed to ETS in their own homes.³ The Healthy People 2010 target for reducing the proportion of children age 6 and younger who are regularly exposed to tobacco smoke at home is 10% (Objective 27-9). The goal for nonsmokers, including children age 4 and over, exposed to ETS in any location (home, work, public) is 45% (Objective 27-10).

The 1998 Nashville BRFSS surveyed respondents about their exposure to ETS. The study defined ETS or second-hand smoke as smoke exhaled by smokers and smoke that comes from the burning end of a cigarette, cigar, or pipe. The survey also asked if respondents had been exposed to ETS in the past 30 days. For respondents who said they were exposed, they were further asked about where they were exposed – home, work, restaurant, or other. Data from the National Health and Nutrition Examination Survey III (NHANES III), conducted from 1994 to 1998, are used in setting the Healthy People 2010 objectives and offer a comparison population for Nashville data.³ One notable difference in the two surveys is that ETS exposure in the NHANES III is based on a clinical measurement (serum cotinine), while the Nashville exposure is based on a self-report by respondents.

Figure 45. Exposure to Environmental Tobacco Smoke Reported in All Respondents and in Nonsmoking Respondents, BRFSS, Nashville, TN , 1998

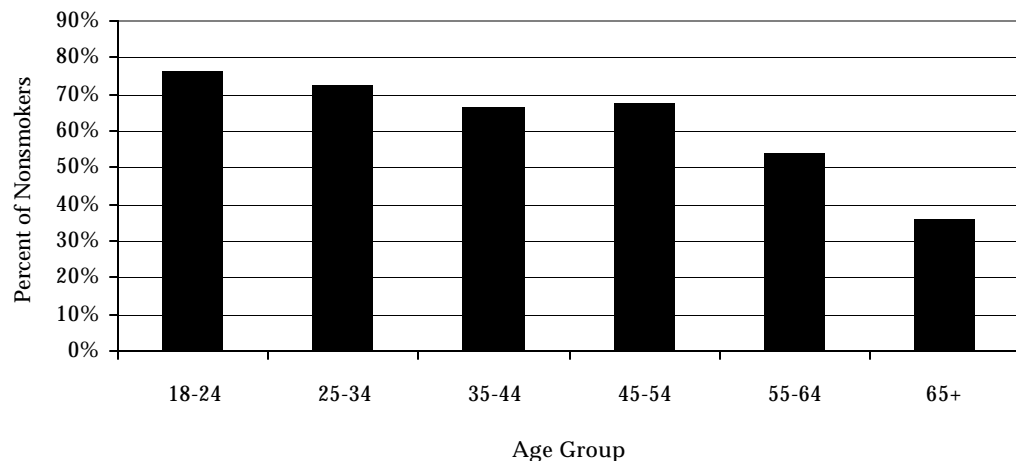


Findings

In Nashville, 68% of all respondents reported exposure to environmental tobacco smoke.

Sixty-eight percent of all respondents reported exposure to ETS (Figure 45) and 63% of nonsmoking respondents reported exposure. Nonsmokers composed 73% of the 1998 Nashville BRFSS. The nonsmokers had similar rates of exposure as the total respondents group when stratified by gender and race. Since smokers, by definition, are exposed to ETS, we will focus on the demographics of the exposed nonsmokers. More men than women nonsmokers were exposed to ETS, 66% and 60%, respectively. Exposure was the same in nonsmoking blacks and whites. Grouping nonsmokers by age, there is a decreasing trend for exposure in the older age groups (Figure 46). Nonsmokers with less than a high school diploma had the lowest rates of reported exposure to ETS of all the education-level groups (Figure 47). Respondents were also asked in what setting they were exposed. They were allowed to give multiple answers. The majority of ETS exposure for nonsmokers was reported to have occurred in restaurants (52%), 29% said they were exposed at work, 23% were exposed at home, and 20% were exposed at locations other than home, work, or restaurants.

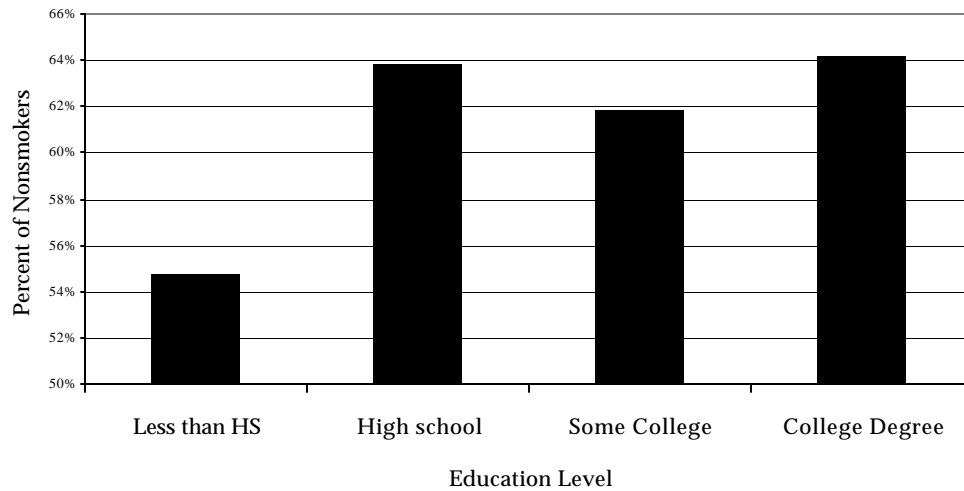
Figure 46. Exposure to Environmental Tobacco Smoke in Nonsmoker Respondents by Age Group, BRFSS, Nashville, TN, 1998



In the U.S., approximately 61% of nonsmoking adults over age 20 were exposed to ETS, according to the National Health and Nutrition Examination Survey III which was conducted from 1988 to 1994. The same data provides an estimate that 68% of children ages 4 to 11 years were exposed to ETS as were 69% of adolescents age 12 to 19. All of these percentages are age-adjusted to the U.S. 2000 standard population. In Nashville, the age-adjusted proportion of nonsmoking adults exposed to ETS is 62%. The trends for gender and age are the same in Nashville and the U.S. There are no estimates of ETS exposure in Tennessee adults, however, the national BRFSS from 1996 estimated that 32.1% of Tennessee children were exposed to ETS in the home. Tennessee had the second highest exposure in the country.

Reducing environmental tobacco smoke exposure is a challenge, especially for children who may have the highest risk for developing health problems.

Figure 47. Exposure to Environmental Tobacco Smoke in Nonsmokers by Education Level, BRFSS, Nashville, TN, 1998



Discussion

Reducing ETS exposure is a challenge, especially for children who may have the highest risk for developing health problems. Passing laws to require that all work sites and public places have smoke-free indoor environments is one solution. Healthy People 2010 incorporates that solution into objectives 27-11, 27-12, and 27-13. However, that does nothing to reduce exposure in the home, the place where children are most often exposed. Perhaps exposure in the home could be addressed by a community-based initiative to educate parents, especially new parents, about the dangers that ETS poses to their children. In Nashville, many of these issues are being addressed by the Smoke-Free Nashville Coalition, a community-based initiative facilitated by MPHD. The Coalition encourages many public places to be smoke-free and produces an annual dining guide of smoke-free restaurants. The Coalition has also begun to address the problem of ETS in the home by providing educational materials to new home owners in certain neighborhoods.

References:

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2. California Environmental Protection Agency. *Health Effects of Exposure to Environmental Tobacco Smoke. Final Report*. Sacramento, CA: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment; September 1997.
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Related Indicators

- Educational attainment
- Cancer screening
- Teenbirths
- Prenatal care
- Low birth weight
- Preterm birth
- Sexually transmitted diseases
- Economic dimension of health problems

2.2.5 Sexual Behavior

Background

Increasing safe sexual behavior is one of the key ways to reduce the risk for transmission of sexually transmitted diseases (STDs), including infection with the Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS). Of all STDs, AIDS is by far the most lethal. In the last decade, the AIDS epidemic has been better understood and, subsequently, a large amount of public health resources have been dedicated to behavioral interventions in an effort to reduce the incidence of disease. Both community-level and individual interventions have been effective in increasing condom use and spreading the message about the importance of safe sex in the general population, especially among HIV-infected persons.¹

Historically, young men had the greatest risk of morbidity and mortality from HIV/AIDS, but the number of women and infants diagnosed with HIV/AIDS is growing. Beyond gender and age, there is also racial disparity in HIV/AIDS. In Nashville, a higher proportion of blacks die from the disease than whites. HIV-related disease is the 7th leading cause of death among blacks in Nashville in 2000, but the 18th among whites. (See Sections 3.4.3 for information pertaining to STD and HIV/AIDS morbidity.) National data show that Hispanics are a high-risk group as well.

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The majority of the Healthy People 2010 objectives for HIV/AIDS are aimed at reducing the incidence, prevalence, comorbidity, and mortality of the disease and increasing awareness in high risk groups. The goal of Objective 13-6 is to increase the proportion of sexually active persons who use condoms to 50%. While we cannot estimate that proportion for the entire sexually active population in Nashville, we can estimate condom use in a portion of the population that recognizes the need for sexual behavior change. Nashville's BRFSS in 1996 and 1998 asked questions about sexual behavior with respect to the respondent's knowledge of HIV. We used responses to questions about changes in sexual behavior, choice of monogamous relationships, and condom use to estimate how residents might have changed their risky behavior because of what they know about HIV transmission. In both survey years, the series of sexual behavior questions was preceded by the statement, "due to what you know about HIV", therefore, the answers should be considered specific responses to HIV risk and not general STD risk. Since these answers are all self-reported, we acknowledge that they may be over- or underestimates of actual sexual behaviors in the community.

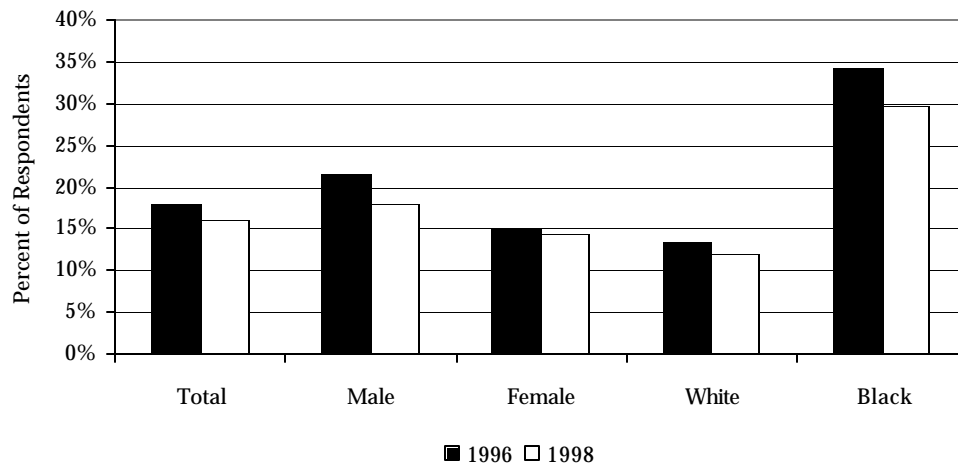
Findings

In 1996, 18% of respondents said they had changed their sexual behavior due to their knowledge of HIV (Figure 48). More men than women changed behavior and more blacks than whites changed behavior. After splitting race groups by gender, in whites more men reported change than women, but in blacks more women reported change than men (data not shown). Age group stratification reveals that more young respondents reported behavior change than older ones (Figure 49). Grouping by education showed that fewer respondents on either end of the education spectrum changed behaviors, but those in the middle (high school graduates and those with some college) changed more (Figure 50). In the 1998 survey, slightly fewer respondents reported change in their sexual behaviors (16%). The trends for gender, race, education, and age group were the same in 1998 as in 1996.

Data Sources

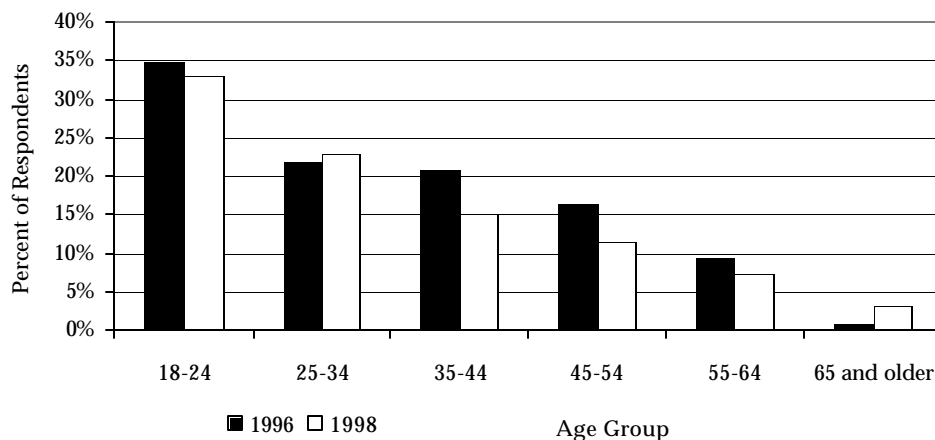
Metro Public Health
Department: BRFSS

Figure 48. Percent of Respondents Who Changed Sexual Behavior Due to Their Knowledge of HIV, Nashville, TN, BRFSS, 1996 and 1998



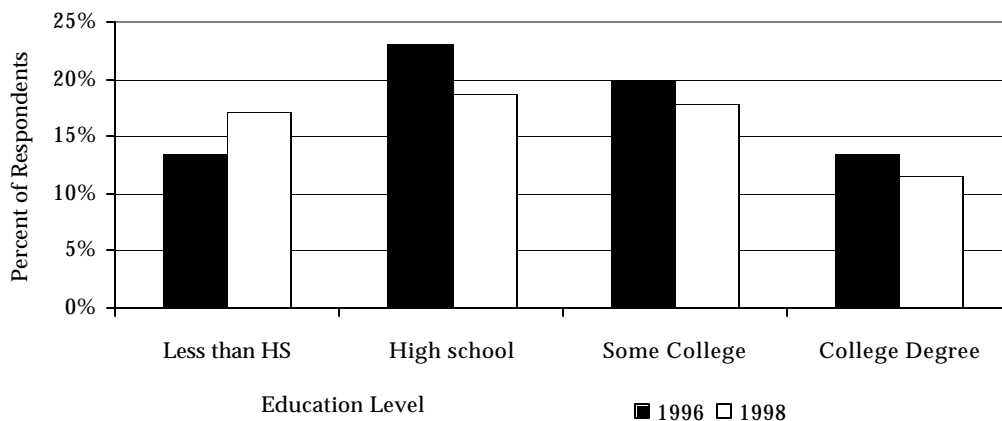
In 1996, 18% of respondents said they had changed their sexual behavior due to their knowledge of HIV.

Figure 49. Percent of Respondents Who Changed Sexual Behavior Due to Their Knowledge of HIV by Age Group, Nashville, TN, BRFSS, 1996 and 1998



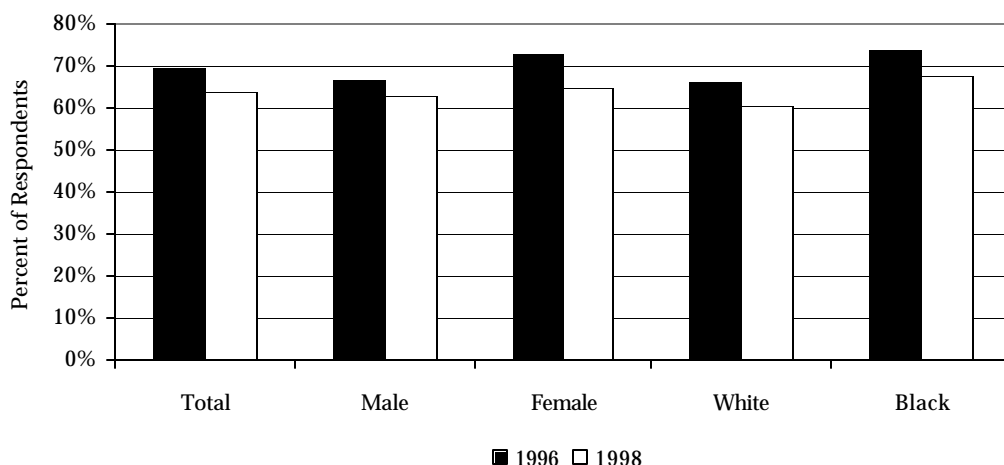
Respondents who reported behavior change were further queried about their protective behaviors, specifically monogamy (only one sexual partner) and condom use. In 1996, 69% reported being in a monogamous relationship. This proportion dropped to 64% in 1998 (Figure 51). In both years, more female than male respondents reported monogamy, as did more blacks than whites. Condom use was reported by 68% of respondents with sexual behavior change in 1996, but only by 48% of respondents in 1998 (Figure 52). In both years, more men than women reported

Figure 50. Percent of Respondents Who Changed Sexual Behavior Due to Their Knowledge of HIV by Education, Nashville, TN, BRFSS, 1996 and 1998



In both 1996 and 1998, more female than male respondents reported monogamy, as did more blacks than whites.

Figure 51. Monogamous Relationships in Respondents Who Reported Sexual Change, Nashville, TN, BRFSS, 1996 and 1998



condom use. The difference between black and white groups was approximately the same in 1996 and 1998, with more blacks reporting condom use than whites. Condom use was more prevalent in younger age groups, with the highest reported use among 18 to 24 year olds (Figure 53).

Figure 52. Condom Use in Respondents Who Reported Change in Sexual Behavior, Nashville, TN, BRFSS, 1996 and 1998

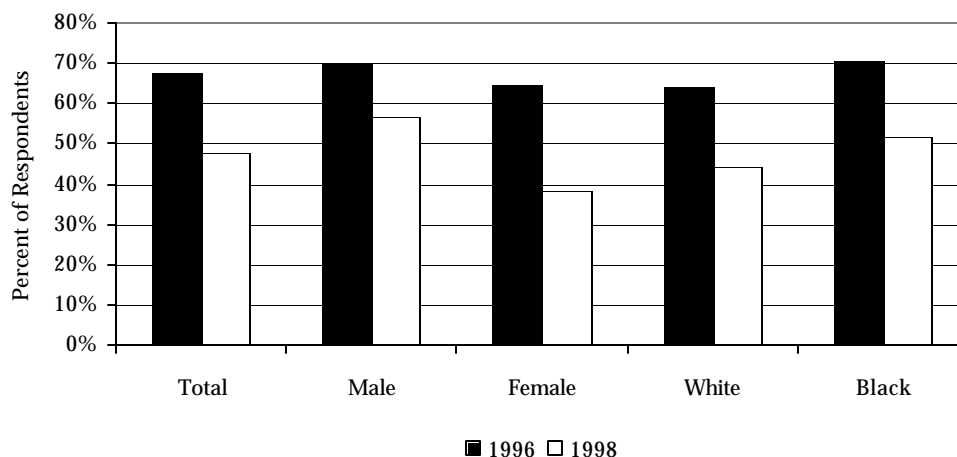
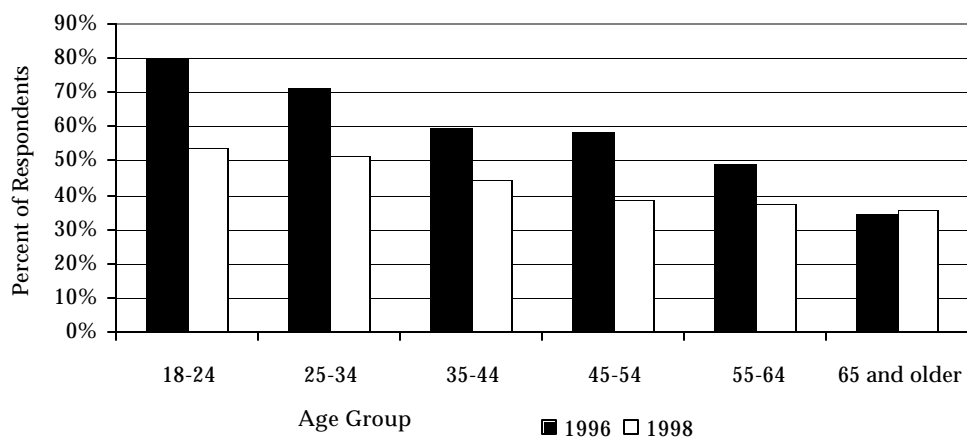


Figure 53. Condom Use in Respondents Who Reported Change in Sexual Behavior by Age Group, Nashville, TN, BRFSS, 1996 and 1998



The goal of Healthy People 2010 objective 13-6 is to increase the proportion of sexually active persons who use condoms to 50%.

Unmarried Men's Use of Condoms

Unmarried men are considered to be one of the most at-risk groups for HIV. In 1996, 73% of unmarried male respondents who reported sexual behavior change also reported using condoms. In 1998, only 60% reported condom use. In both years, more black males reported condom use than whites. The age-trend was also the same in 1996 and 1998, with more men in the younger age groups reporting condom use than men in the older age groups. In 1996, condom use appeared to be similar in all education-level groups, however, in 1998 only 41% of unmarried men with less than a high school diploma used condoms, while 68% with a college education did.

The proportion of Nashville's population that changed sexual behavior appears to be larger than that of Tennessee and the U.S. (Table 8). The 1998 Nashville age-adjusted percentage of BRFSS respondents who changed their sexual behavior as a result of their knowledge of HIV was 15%, while only 11% of Tennesseans did. When specific behaviors are considered, Nashville had smaller percentages of the population reporting monogamy and condom use than did Tennessee or the U.S.

Table 8. Age-adjusted* Percent of Respondents Who Reported Sexual Behavior Changes, BRFSS, Nashville 1996 and 1998, Tennessee 1997, and U.S. 1997

	Nashville, 1996	Nashville, 1998	Tennessee, 1997	U.S. 1997 **
<i>Changed Sexual Behavior</i>				
Total	17%	15%	11%	10%
Male	20%	17%	12%	11%
Female	15%	14%	10%	9%
Black	30%	27%	24%	25%
White	13%	12%	8%	8%
<i>Monogamy in Those Who Changed Sexual Behavior</i>				
Total	68%	61%	85%	80%
Male	72%	63%	86%	78%
Female	68%	56%	84%	81%
Black	72%	70%	87%	82%
White	65%	54%	86%	78%
<i>Condom Use in Those Who Changed Sexual Behavior</i>				
Total	59%	44%	63%	56%
Male	56%	41%	66%	58%
Female	56%	36%	60%	54%
Black	59%	49%	61%	56%
White	57%	39%	63%	55%

* Age-adjusted to the U.S. 2000 standard population.

** U.S. percents represent the median values for the 50 states, District of Columbia, and Puerto Rico

Discussion

As would be expected, the BRFSS data suggest that there is a need for community-based education on the harms of risky sexual behavior. MPHD's efforts to combat the spread of STDs focus on the entire population. MPHD supports and facilitates the community-based STD Free! initiative which consists of volunteers from the faith community, law enforcement, local schools and universities, health care providers, health care facilities, and social service agencies. STD Free! has ongoing educational activities in the community and special annual events such as the STD Free! Haunted House. The Haunted House has received national acclaim for its educational methods. The majority of visitors are teenagers and young-adults. Visitors to the Haunted House see graphic examples of the risks and potential outcomes associated with various STDs such as syphilis, chlamydia, and gonorrhea. The event also offers free testing for HIV and syphilis.

Reference:

1. U.S. Department of Health and Human Services. *Healthy People 2010* (Conference Edition, in Two Volumes). Washington, D.C.: January 2000.

The proportion of Nashville's population that changed sexual behavior appears to be larger than that of Tennessee and the U.S.

Metro Public Health Department supports and facilitates the community-based STD Free! initiative which consists of volunteers from the faith community, law enforcement, local schools and universities, health care providers, health care facilities, and social service agencies.

Related Indicators

- Sexual behavior
- Sexually transmitted diseases
- Tobacco use - smoking

2.2.6 Substance Abuse and Illicit Drug Use

Background

Substance abuse and use of illicit drugs present a plethora of public health problems to drug users and the community as a whole. Substance abuse and illicit drug use are associated with the spread of many communicable diseases – tuberculosis, sexually transmitted diseases, such as Acquired Immunodeficiency Syndrome (AIDS), syphilis, and hepatitis – as well as non-traditional public health issues of violence and crime.^{1, 2} Drug abuse may foster a poor environment for the children, born and unborn, of the abusers and may also be an indicator of mental illness. Drug abusers place a significant burden on the medical community. Drug-related emergency hospital visits are at historically high rates.² The main reason for these visits is drug overdose (49%). The public health community also has the responsibility of providing effective addiction treatment and counseling services. Drug abuse is a large contributing factor to injuries and premature death. However, there is a decreasing trend in drug-related mortality in both the nation and Nashville (Table 9). In the United States, the age-adjusted drug-induced mortality rate went from 7.0 per 100,000 population in 1999 to 5.8 in 2000. In Nashville, the age-adjusted rates fell from 9.9 per 100,000 population in 1999 to 7.4 in 2000.

Table 9. Drug-induced Mortality Rates per 100,000 Population, Age-adjusted*, Nashville and U.S., 1999 and 2000

	Nashville 1999	Nashville 2000	U.S. 1999	U.S. 2000**
Total	9.9	7.4	7.0	5.8
Gender				
Males	15.2	9.9	9.6	
Females	5.6	5	4.4	
Race				
White	10.7	8.3	6.9	
Black	7.7	6.3	9.5	

*Rates were age-adjusted to the United States 2000 standard population.

**National mortality rates for 2000 are preliminary, not final.

The Healthy People 2010 Objective 26 - 10c for the nation is to reduce the proportion of adults (aged 18 years and older) using illicit drugs from 5.8% in 1998 to 3.0% in 2010.³ Annual surveys of the population are done on the national level by the Substance Abuse and Mental Health Services Administration (SAMHSA) of the U.S. Department of Health and Human Services. However, no surveys are done on the local level. Because of the association between drug abuse and crime, we used arrests for drug abuse violations in Nashville as a proxy for the prevalence of illicit drug use. There are several limitations of using arrests to estimate the prevalence of drug use. The results could produce an underestimate because not all drug users get arrested, or it could be an overestimate because some drug users may be arrested multiple times in a year – unique individuals are not identified when counting number of arrests.

Data Sources

Metropolitan Nashville
Police Department

Findings

Arrests for drug abuse violations in Nashville accounted for 15% of all arrests in 2000 (Table 10). The majority of persons arrested for drug abuse violations were men (77%). There were more blacks (61%) arrested on these charges than whites (39%). Considering the arrests by age of the offender, nearly two-thirds (63%) of those arrested were under age 35 at the time of arrest. Gender, race, and age-distribution data on arrests are not currently available for 2000 on the state level; however, they are available on the national level. Nashville, like the U.S., had more men arrested on drug abuse violations than women (Table 10). However, the race distribution was different. The majority of drug abuse arrests in the U.S. were in whites (63%), while in Nashville, the majority were in blacks (61%). The age distributions of Nashville and U.S. adult drug abuse violations were similar, with more than 60% being adults under age 35.

Table 10. Adult Arrests (Age 18 and Older) for Substance/Drug Abuse Violations, Nashville, Tennessee, and U.S., 2000

	Nashville 2000 ¹	Tennessee 2000 ²	U.S. 2000 ²
Arrests for drug abuse violations	7,515	15,998	907,754
Total number of arrests	49,622	151,419	7,556,678
Percent of total arrests	15%	11%	11%
Percentage Distribution of Drug Abuse Arrests by Gender, Race, and Age			
<i>Gender</i>			
Males	77%	NA ³	82%
Females	23%	NA	18%
<i>Race</i>			
White	39%	NA	63%
Black	61%	NA	35%
<i>Age Groups</i>			
18-24 years	32%	NA	41%
25-34 years	31%	NA	28%
35-44 years	28%	NA	22%
45-54 years	8%	NA	7%
55-64 years	1%	NA	1%
65 years or older	0%	NA	0%

¹Metropolitan Nashville Police Department.

²Uniform Crime Reports for 2000. <http://www.fbi.gov/ucr/00cius.htm>

³Rates not available for Tennessee.

Arrests for drug abuse violations in Nashville accounted for 15% of all arrests in 2000. The majority of drug abuse arrests in the U.S. were in whites (63%) , while in Nashville, the majority were in blacks (61%).

There appears to be a trend of an increasing percentage of drug abuse violations in Nashville. In 1997 only 9% of adult arrests were from drug abuse violations, in 1998, 10% were from drug abuse violations.⁴ In 1999, the percentage dropped to 8%, but it nearly doubled in 2000 to 15% of arrests. Comparing Nashville to Shelby County (Memphis) and Knox County (Knoxville), we find that the percentage of arrests due to drug abuse violations were similar and also increasing. In Shelby County, 9% of adult arrests were from drug abuse violations in 1997, and 10% in 1998.⁴ In Knox County, 8% of adult arrests were from drug abuse violations in 1997, and 11% in 1998.⁴ Nashville has a higher percentage of arrests from drug abuse violations than the nation and Tennessee (Table 10). As we saw in Nashville and Shelby and Knox Counties, the state has experienced an increase in arrests for drug abuse violations – in 1999, it was only 9% of total arrests, but this percentage rose to 11% in 2000.

Discussion

In Nashville, drug-induced mortality is decreasing, but arrests from drug abuse violations are increasing. While these trends seem to be conflicting, there may be reasonable explanations for both of them. Perhaps the simplest interpretation is that there are growing numbers of substance abusers, while addiction treatment programs are succeeding in keeping at least some of them from premature death. Clearly there is an opportunity for the public health community to improve the welfare of our county in many ways by treating drug abuse. Research suggests that addiction treatment may be more effective if provided in conjunction with basic medical services, especially for individuals with psychiatric conditions.⁵ Without significant increase in costs to the medical or addiction treatment programs, these individuals were more successful in quitting drugs and went longer periods without a relapse to drug use. The Opening Doors program at MPHD follows a similar treatment model. It offers case management for both the patient's addiction and medical problems. It operates under the philosophy that addiction is a primary illness that requires both addiction treatment and medical care and that untreated patients might otherwise be arrested, institutionalized, or die prematurely. The goal of this program is to assist county residents who have no means of paying for treatment services.

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2. U.S. Executive Office of the President. Office of National Drug Control Policy. Reducing Drug Abuse in America: An Overview of Demand Reduction Initiatives. Office of National Drug Control Policy, January 1999.
3. U.S. Department of Health and Human Services. *Healthy People 2010* (Conference Edition, in Two Volumes). Washington, D.C.: January 2000.
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5. Weisner C, Mertens J, Parthasarathy S, Moore C, Lu Y. Integrating primary medical care with addiction treatment: a randomized controlled trial. *Journal of the American Medical Association*. 2001;286(14):1715-1723.

Related Indicators

- Bicycle helmet use
- Leading causes of death
- Economic dimension of health problems

2.2.7 Safety Belt Use

Background

The goal of promoting and mandating safety belt use is to reduce injuries and fatalities in motor vehicle accidents. Motor vehicle accidents (MVAs) are a leading cause of unintentional accidental deaths, accounting for 39% of all accidental deaths in 1999 in Nashville, TN. Nashville's age-adjusted mortality rate from MVAs is similar to that of the United States (US) – 1999 Nashville: 16.0 per 100,000; 1999 U.S.: 15.5 per 100,000.

Safety belt use in Tennessee has been mandated by law since 1986 as secondary law and became primary law in July of 2000. The Tennessee Health Status Report of 1999 reported that 66% of Tennessee adults always wear safety belts.¹ In the United States, 69% of the adult population reports always wearing a seat belt.² The U.S. Department of Health and Human Services' *Healthy People* report states that the goals for nationwide use of safety belts are 85% by the year 2000 and 92% by the year 2010 (Objective 15 - 19).³ To estimate Nashville's progress towards the national goal, we estimated use of safety belts in adults and children and the use of child safety seats from safety questions in the 1996 and 1998 Nashville BRFSS.

Findings

Adult Safety Belt Use

In 1996, 66% of Nashville's adults reported always using safety belts (Figure 54). This percentage increased slightly to 68% in 1998. From 1996 to 1998, rates of use rose for men and women, whites and blacks. However, women were consistently more likely to wear safety belts than men – 72% of women compared to 58% of men in 1996 and 74% of women compared to 62% of men in 1998. Blacks had lower rates of safety belt use than whites and also increased use less than whites from 1996 to 1998. Sixty-eight

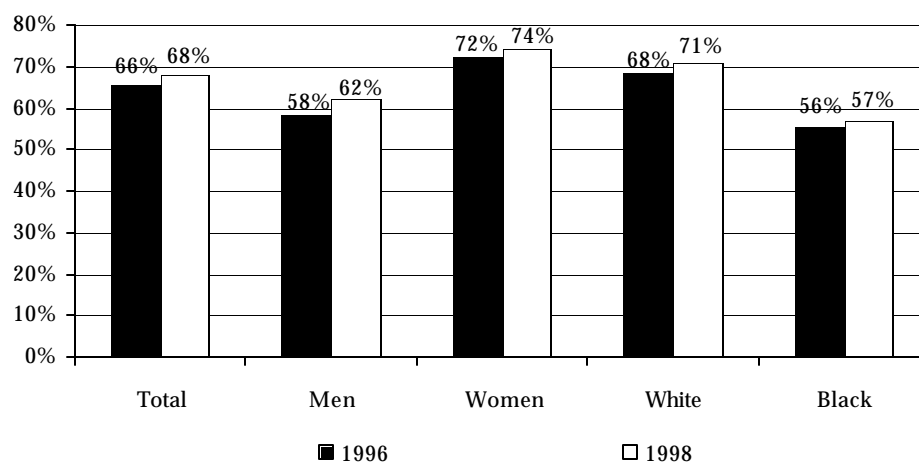
Additional Data

Appendices
pages D-37 - D-38

Data Sources

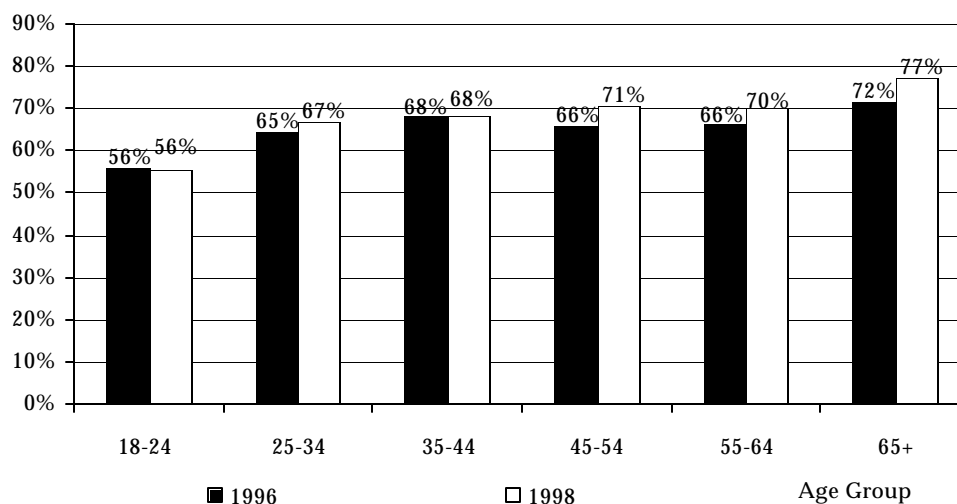
Metro Public Health
Department: BRFSS

Figure 54. BRFSS Respondents Who Always Use Safety Belts, Nashville, TN, 1996 and 1998



percent (68%) of whites wore safety belts in 1996 compared to 56% of blacks. In 1998, 71% of whites always wore safety belts, compared to 57% of blacks. Considering safety belt use by age groups reveals that use is more common in older age groups (Figure 55). In 1996, safety belt use ranged from 56% in the 18-24 year old group to 72% in the 65+ age group.

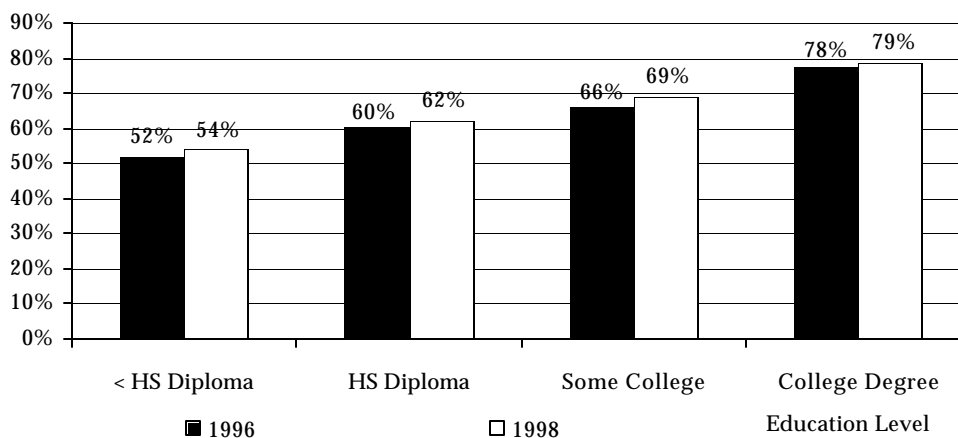
Figure 55. BRFSS Respondents Who Always Use Safety Belts, By Age Group, Nashville, TN, 1996 and 1998



In 1996, 66% of Nashville's adults reported always using safety belts. This percentage increased slightly to 68% in 1998.

In most age groups, there was an increase in use in 1998. The largest increases were of 5% in the 45-54 and 65+ age groups. Education level also appeared to influence safety belt use. Overall, safety belt use was higher in groups with higher education (Figure 56). In

Figure 56. BRFSS Respondents Who Always Use Safety Belts, by Education Level, Nashville, TN, 1996 and 1998



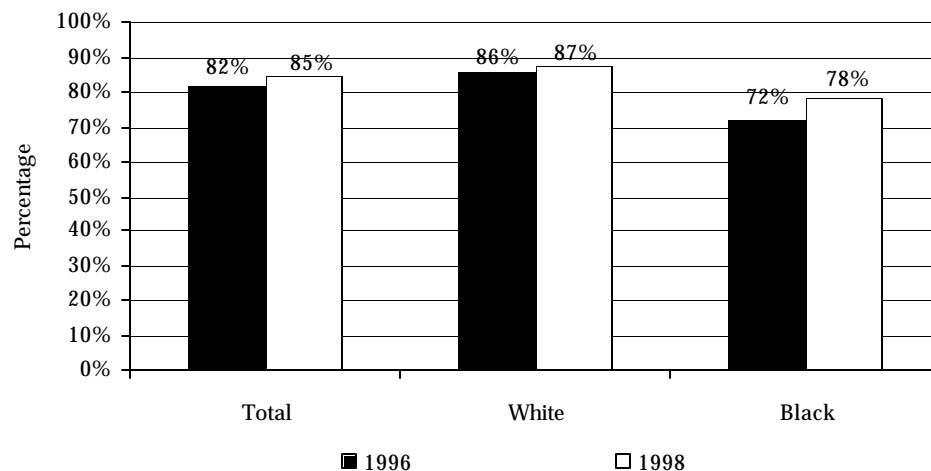
1996, the percentage of persons who reported always wearing seat belts went from 52% in persons with less than a high school diploma, to 60% in those with a high school diploma, to 66% in those with some college, to 78% in those with a college degree (Figure 56). There was an average two percentage points increase in each education group in 1998: 54% of residents with less than a high school diploma always wore safety belts, while 79% of those with a college degree did.

Nashville adult residents reported much higher rates of safety belt (and safety seat) use for children under age 16 in their households than they did for themselves.

Child Safety Restraint Use

Nashville adult residents reported much higher rates of safety belt (and safety seat) use for children under age 16 in their households than they did for themselves. In 1996, 82% reported children always wear safety belts or are restrained in child safety seats (Figure 57). This percentage rose to 85% in 1998. Rates were higher in whites than blacks for both years – 1996: whites 85%, blacks 72% and 1998: whites 87%, blacks 78%. The education level of adults in Nashville appears to be associated with use of child safety restraints. In 1996, 68% of persons with less than a high school diploma used child safety restraints, compared to 89% of respondents with a college degree (Figure 58). In 1998, the percentages rose in most education groups. The rate increased 11 percentage points in respondents who did not finish high school, and rose 4 points in respondents who completed college.

Figure 57. BRFSS Respondents Who Always Use Child Safety Seats or Belts, Nashville, TN, 1996 and 1998



Comparison of Nashville to the U.S.

Nashville data were age-adjusted to the U.S. 2000 standard population for comparison with the U.S. 1997 BRFSS results (Table 11). Comparing the adjusted rates for always using safety belts, we find that in 1996 Nashville rates were consistently lower than the U.S. rates. The largest difference was in safety belt use for blacks. In 1998, Nashville rates were very close to those of the U.S., but the rate for blacks was still lower than the U.S. rate. Reported use of safety restraints for children under age 16 in Nashville was

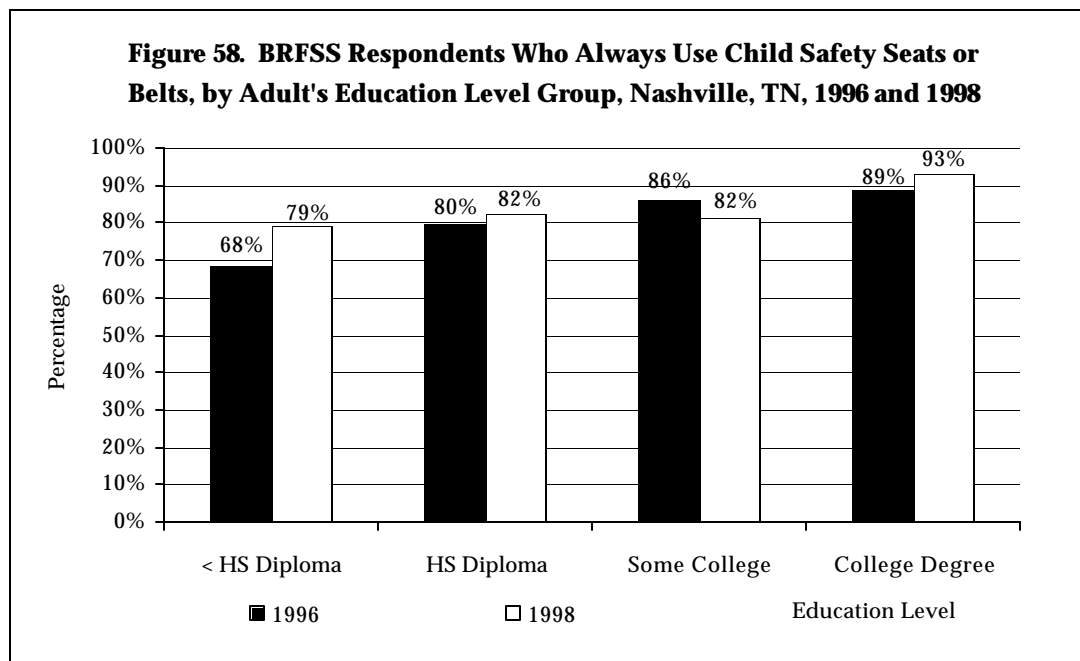


Table 11. Age-adjusted Rates* of Safety Belt Use, Nashville 1996 and 1998 and U.S. 1997

Population	U.S. 1997 BRFSS	Nashville 1996 BRFSS	Nashville 1998 BRFSS
Total	69%	66%	69%
Male	62%	59%	62%
Female	75%	72%	74%
White	70%	68%	71%
Black	63%	56%	59%

*Age-adjusted rates are based on the age distribution of the U.S. 2000 standard population.

Table 12. Age-adjusted Rates* of Child Safety Restraint Use in Nashville 1996 and 1998 and U.S. 1997

Population	U.S. 1997 BRFSS	Nashville 1996 BRFSS	Nashville 1998 BRFSS
Total	85%	83%	83%
Male	85%	83%	86%
Female	85%	84%	81%
White	87%	88%	84%
Black	82%	70%	80%

*Age-adjusted rates are based on the age distribution of the U.S. 2000 standard population.

slightly lower than the rates in the U.S. (Table 12). The biggest difference in Nashville was that the 1996 rate for blacks was 12 percentage points lower than the U.S. rate. Nashville's black rate improved in 1998, with only a 2 point differential between Nashville and the U.S.

Discussion

How do we compare to U.S. and to Healthy People 2000 and 2010 goals? We have not reached the 85% Healthy People 2000 goal, and we have much farther to go to reach the Healthy People 2010 goal of 92% safety belt use. The race, gender, age, and education trends in the Nashville data are similar to those reported by more in-depth safety belt use studies.⁴ While it is promising that Nashville's safety belt use is nearly the same as the rates for the U.S., we must note the potentially unreliable nature of the data since it comes from self-reports instead of direct observation. Studies have been done to observe, first-hand, whether car drivers and passengers wear seatbelts.^{5,6} The results from these studies tell us that seat belt use can be road-specific – people traveling on interstate highways are more likely to wear safety belts than people traveling on city streets.⁵ Some observations from these studies support the findings we have from our survey. They find that more drivers (as opposed to passengers), more women, and more people age 25 or older wear safety belts.⁵ Recent research done by the University of Tennessee Transportation Center found that residents in urban counties wore safety belts more often than rural county residents.⁶

The three groups that require targeted interventions to increase safety belt use rates are blacks, people under age 25, and people without a college education. Many programs to promote safety belt usage in Nashville and Tennessee are already in place. For over a decade, MPH D has promoted child safety seat usage by giving away car seats to parents of limited economic means. On July 1, 2001, a new Tennessee law took effect which makes it mandatory for all passengers between ages 4 and 17 to wear safety belts when riding in any seat of a vehicle operated by a person with a learner's permit or intermediate driver license. To enforce this law and existing safety belt use laws, Tennessee is participating in the "Click It or Ticket" program.⁶ Nationally, the U.S. Department of Transportation and Nashville's Meharry Medical College joined efforts in a nationwide initiative to increase safety belt use in blacks.⁷

References:

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2. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System. Prevalence Data 1997 [online]. Available at: <http://apps.nccd.cdc.gov/brfss/>. Accessed May 21, 2001.
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7. Meharry Medical College. Achieving a Credible Health and Safety Approach to Increasing Seat Belt Usage Among African Americans. 1999.

The three groups that require targeted interventions to increase safety belt use rates are blacks, people under age 25, and people without college education.

Related Indicators

- Safety belt use
- Leading causes of death
- Economic dimension of health problems

Additional Data

Appendices
page D-39

Data Sources

Metro Public Health
Department: BRFSS

2.2.8 Bicycle Helmet Use

Background

Promoting bicycle helmet use is part of the public health community's effort to reduce morbidity and mortality from all types of injuries. Bicycle helmets can protect cyclists from head injury and are required for children by Tennessee and Nashville laws.^{1,2} In Nashville, all persons under 16 years of age must wear a helmet when riding a bicycle. Public health recommendations from federal agencies call for persons of all ages to wear helmets, but emphasize that children under age 15 are the primary target group for the recommendations.³ The majority of children in the United States ride bicycles, but their rate for use of helmets is lower than that of adults. The National Highway Traffic Safety Administration estimates that bicycle helmet use could prevent 39,000 to 45,000 head injuries in children between the ages of 4 to 15.⁴ They also identify children under age 14 as five times more likely to be injured when riding a bicycle than older riders.

The national goal for bicycle helmet use was 50% by the year 2000.⁵ In the Healthy People 2010 goals, it is not the percentage of riders that is targeted, but the number of states with laws requiring bicycle helmets for bicycle riders (Objective 15-24). The goal is that all states and the District of Columbia make bicycle helmet use mandatory for all cyclists.⁶ In 1999, only 15 states had helmet laws for cyclists under age 18 years or younger, however, this does not account for the county and city governments that may have helmet laws. In this respect, Nashville is already partway to achieving the goal since it has a youth bicycle helmet law. To measure the public health effectiveness of the law, we need to estimate the use of bicycle helmets by the youth of Nashville. In the 1996 Behavioral Risk Factor Surveillance Survey (BRFSS), adults contacted for the survey were asked if children in their households, aged five to 15, wore bicycle helmets when riding a bicycle. We recognize that this estimate may be biased, and possibly an overestimate, since it comes from self-reported data and not from direct observation.

Findings

Thirty-one (31%) percent of households contacted for the 1996 Behavioral Risk Factor Survey reported that their children aged five to 15 always wore helmets when riding bicycles. There was a difference of approximately 9 percentage points between blacks and whites, with whites reporting a rate of 34% use and blacks 25% (Figure 59). Considering the adult respondent's educational attainment, we found that adults with higher levels of education reported higher rates of bicycle helmet use for children (Figure 59). It ranged from 25% in those with less than a high school diploma (Less than HS Diploma) to 38% in those with a Bachelor's degree.

The 1999 nation-wide BRFSS data place the median rate for youth bicycle helmet use at 33% for the United States, with rates of 35% for whites and 30% for blacks (Table 13). Nashville data, after age-adjustment to make them comparable to the U.S. data, showed that our rate of 32% was similar to the national data, however the racial disparity was greater in Nashville than for the nation. After age-adjustment, 36% of whites reported children always wear bicycle helmets, compared to 20% of blacks. In the state of Tennessee, 1999 rates were higher than both Nashville and the U.S. median. Forty-two percent of respondents to the Tennessee BRFSS reported that children in their household always wore bicycle helmets. There also appeared to be only a small difference between white and black Tennesseans –bicycle helmet use reported by whites was 42% and 40% by blacks.

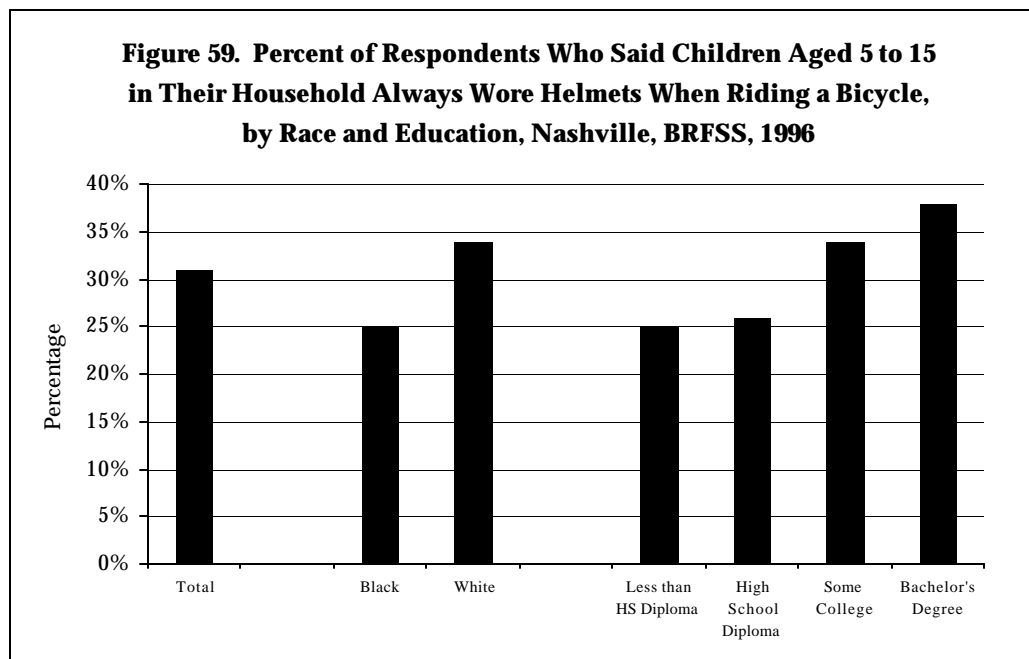


Table 13. Age-adjusted Percent of Children Aged 5 to 15 Years Reported to Always Wear Helmets When Riding Bicycles, Nashville 1996, Tennessee 1999, and U.S. 1999

	U.S. 1999 BRFSS	Tennessee 1999 BRFSS	Nashville 1996 BRFSS
Total	33%	42%	32%
White	35%	42%	36%
Black	30%	40%	20%

Discussion

As of 1996, Nashville had not reached the national goal of 50% bicycle helmet usage. Nashville has a youth bicycle helmet law, but the law is not enough to get children to wear bicycle helmets. Research by other groups on barriers to helmet use has identified cost, wearability of helmets, lack of knowledge about helmet effectiveness, and peer-pressure among children as key issues for intervention.¹ Educational interventions for parents should depend on the parental education level and the economic position of the community. Studies have found that in high-income neighborhoods, a little parental education can go a long way to increasing bicycle helmet use in children.⁷ In such neighborhoods, school-based programs may be sufficient. In Nashville, the high-risk portion of the community appears to be blacks and parents who have not obtained education beyond high school. Since 1997, the Division of Health Promotion of MPHD has made efforts to address this problem by distributing bicycle helmets to children from low-income families. Bicycle rodeo events are held at day care and Head Start centers, targeting children who range in age from 3 to 5 years old. Health Promotion staff also give educational lectures on child safety which include emphasis of the need for children to use bicycle helmets. These lectures are typically directed to adults who work with children in schools, day care centers, or as social workers. Still, the long-term effectiveness of most bicycle helmet

promotion programs has been poor.³ The best solution may be for the public health community to work in concert with community groups so that more of the public is reached with this important information.

References:

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As of 1996, Nashville had not reached the national goal of 50% bicycle helmet usage. Nashville has a youth bicycle helmet law, but the law is not enough to get children to wear bicycle helmets.

Related Indicators

- Sexual behavior
- Leading causes of death
- Cancer incidence

Additional Data

Appendices
pages D-30, D-41, D-42

2.2.9 Cancer Screening

Background

Cancer is the second leading cause of death in Nashville. In the year 2000 alone, cancer claimed 9,730 years of potential life from our residents (see Section 3.3.2 for more information). Breast, cervical, and colon cancers were responsible for 18% of the cancer deaths in 2000. Effective screening measures for early detection are readily available for these three types of cancer. The purpose of cancer screening tests such as mammograms, Pap tests, and digital rectal exams are to prevent deaths and improve treatment outcomes through early detection. National recommendations are for all women age 18 and older to have annual pap tests and women over the age of 40 to have annual mammograms. The recommendation for colon cancer screening has recently been revised from digital rectal exams (DRE) to a combination of a fecal occult blood test and sigmoidoscopy for both men and women over age 50.¹

Healthy People 2010 includes goals for reducing cancer deaths and increasing the use of cancer screening procedures. The mortality-reducing targets for 2010 are to reduce female breast cancer deaths to 22.3 per 100,000 population (objective 3.3), to reduce cervical cancer deaths to 2 per 100,000 population (objective 3.4), and to reduce colorectal cancer deaths to 13.9 per 100,000 population (objective 3.5) (all rates are age-adjusted).² The female-specific cancer screening targets for 2010 are to increase the percentage of women, ages 18 and over, who have ever had a Pap test to 97% (objective 3.11a), to increase those who have had a Pap test in the last 3 years to 90% (objective 3.11b), and to increase the percentage of women, ages 40 and over, who received a mammogram within the last 2 years to 70% (objective 3.13).² The target for colorectal cancer screening in both males and females is to increase the percentage of adults who have ever received a sigmoidoscopy to 50% by 2010 (objective 3.12b).² The Healthy People 2000 target for DRE was for 40% of people aged 50 and older to have this exam annually.³

In this report, we estimated adherence to cancer screening recommendations via questions asked in the Nashville BRFSS of 1996 and 1998. In 1996, the questions on mammography and Pap tests were part of a long list of women's health questions. The female respondents were also asked why they had the tests done and with what frequency. In 1998, the mammography and Pap test questions were much more limited. Questions on DREs were the same both years, except in 1996 all respondents were asked the question, but in 1998 only males were asked.

Findings

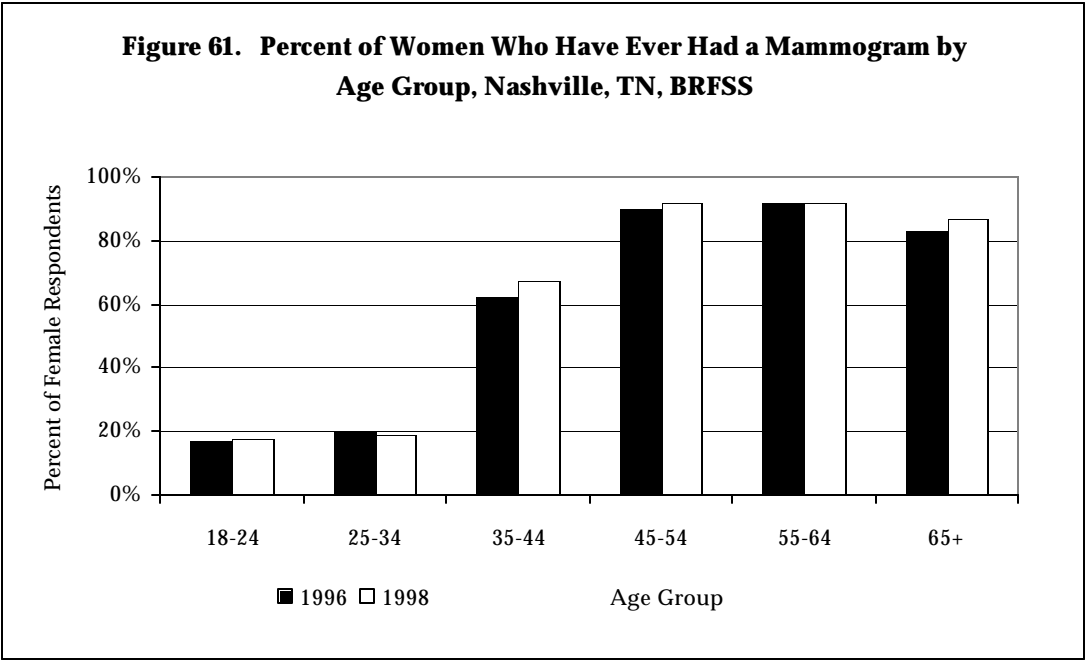
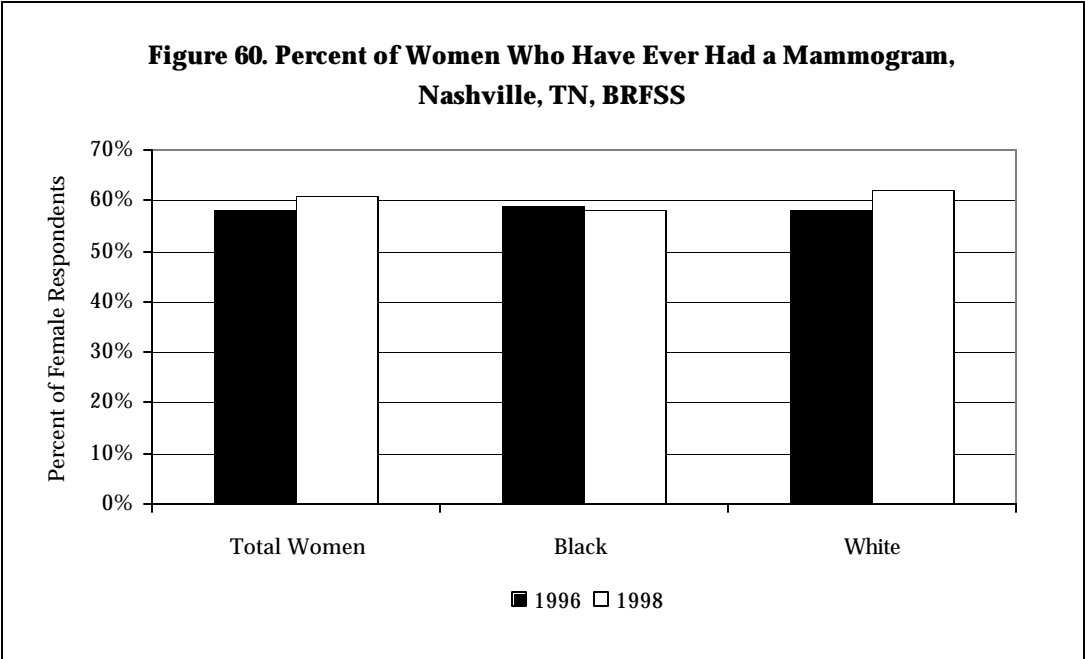
Mammography

Mammography rates in Nashville women were below the Healthy People 2010 targets in both 1996 and 1998; however women 45 years and older exceed the goal of 70% adherence (Figures 60 and 61). This finding is appropriate as it matches the recommendation that women age 40 and older have regular mammograms. No apparent racial disparities are seen between whites and blacks for mammography. Educational disparities are also negligible, although more respondents with less than a high school diploma reported having had a mammogram than respondents with higher levels of education (data not shown). There was only a small increase in reported mammograms from 1996 to 1998.

Data Sources

Metro Public Health
Department: BRFSS

Mammography rates in Nashville women were below the Healthy People 2010 targets in both 1996 and 1998; however, women 45 years and older exceed the goal of 70% adherence.



Nashville rates are similar to those of Tennessee and the U.S. (Table 14). Data from the 2000 BRFSS for the U.S. and data specifically from Tennessee show similar trends with respect to the lack of racial disparity and higher rates in women with lower levels of education (data not shown).

Table 14. Age-adjusted Adherence Rates for Cancer Screening Tests

Test	Nashville, TN 1996	Nashville, TN 1998	Tennessee	U.S.
Mammography*	61%	63%	63%	62%
Pap test*	95%	95%	94%	95%
Digital Rectal Exam**	72%	76%^	64%	71%

* Tennessee and U.S. data are from the 2000 BRFSS.

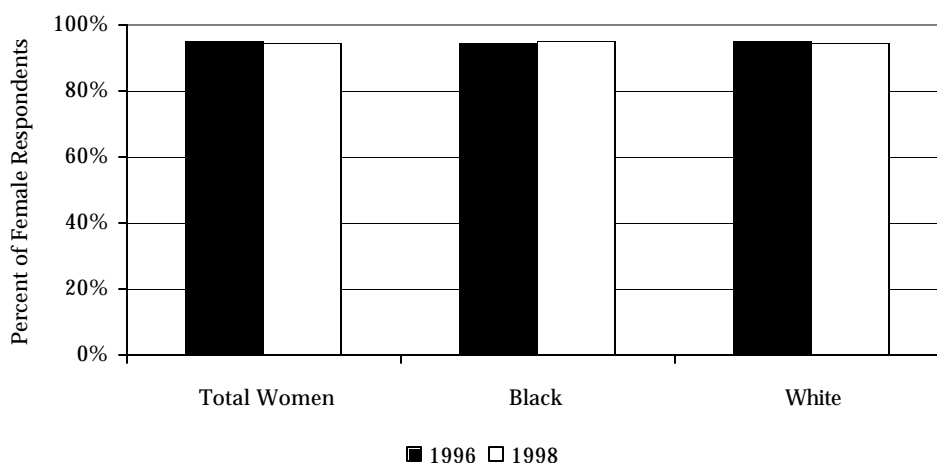
** Tennessee and U.S. data are from the 1995 BRFSS.

^ This rate is for men only; women were not asked the question regarding digital rectal exam in 1998.

Pap Tests

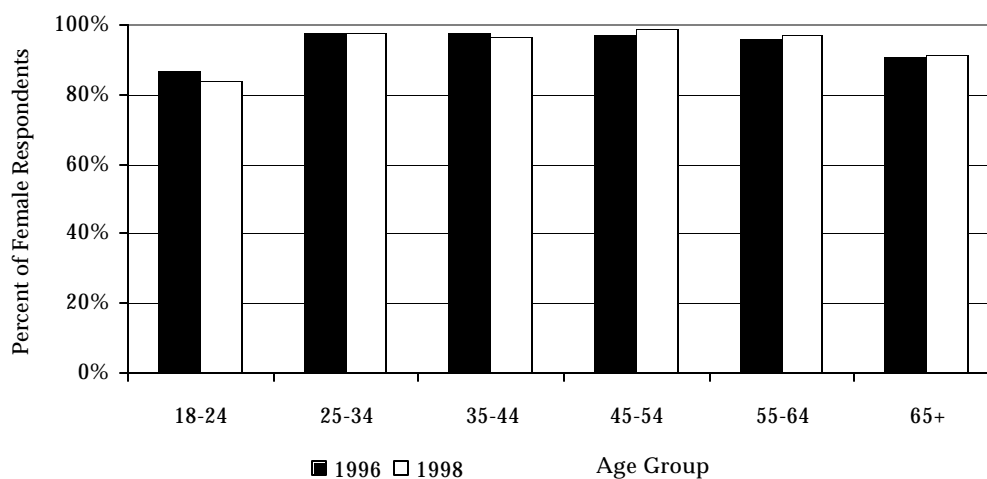
Nashville came very close to meeting the Healthy People 2010 targets for Pap tests. Adherence rates remained steady from 1996 to 1998 at 95% (Figure 62). When grouped by age, only the 18-24 age group was below the 97% national target (Figure 63). There was a slight trend towards better adherence with increasing education. No racial disparities were seen. The year 2000 BRFSS results showed that Tennessee and the U.S. had similar rates of adherence to the Pap test (Table 14).

Figure 62. Percent of Women Who Have Ever Had a Pap Test, Nashville, TN, BRFSS.



Nashville came very close to meeting the Healthy People 2010 targets for Pap tests.

Figure 63. Percent of Women Who Have Ever Had a Pap Test by Age Group, Nashville, TN, BRFSS.

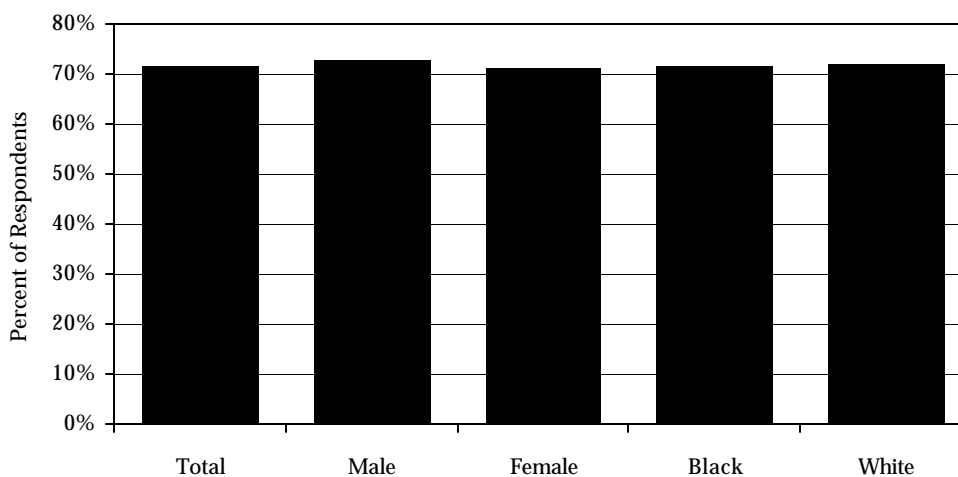


From the 1996 BRFSS, we estimated that 72% of adults over age 40 had a digital rectal examination.

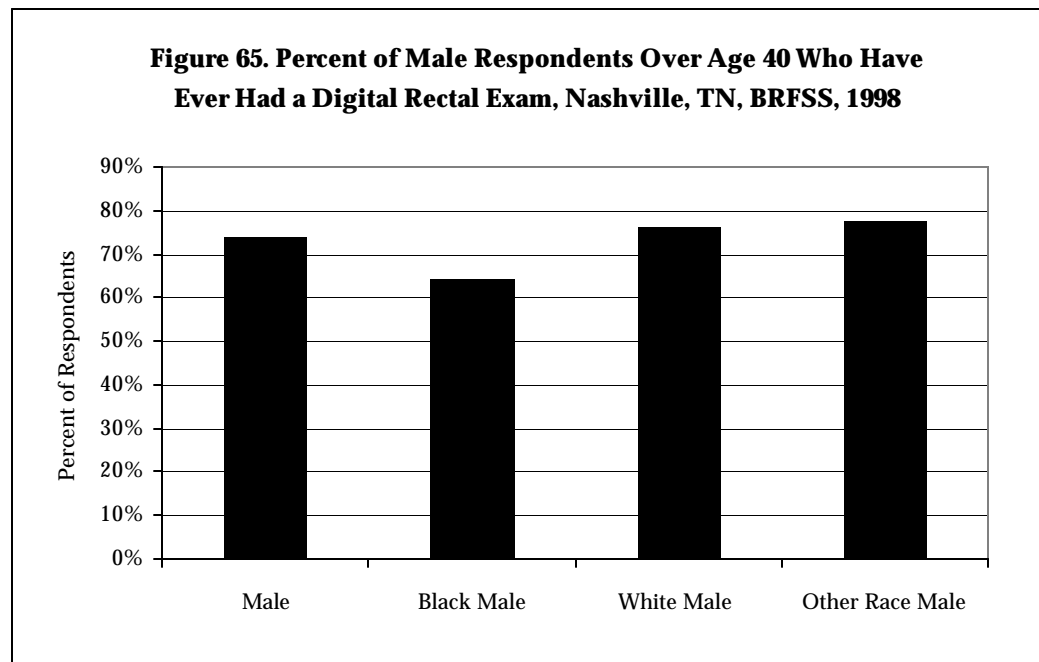
Rectal Exams

From the 1996 BRFSS, we estimated that 72% of adults over age 40 had a DRE (Figure 64). This estimate puts Nashville beyond the Healthy People 2000 target of 40%. In the 1998 survey, only men were questioned regarding DRE, and again the adherence was beyond the Healthy People 2000 target. Overall, there was no trend by respondent's education. There did appear to be better adherence in respondents over age 45. There was only a

Figure 64. Percent of Respondents Over Age 40 Who Have Ever Received a Digital Rectal Exam, Nashville, TN, BRFSS, 1996



small difference between black and white rates for DRE in 1996, but in 1998 when only men were surveyed, fewer blacks than whites reported having had the test – 64% compared to 76%, respectively (Figure 65).



After 1995, the national BRFSS questions regarding screening for colon cancer changed from DRE to sigmoidoscopy, to follow the change in screening recommendation. Data from the 1995 nationwide BRFSS show that the U.S. had similar DRE adherence rates compared to Nashville (Table 13). Tennessee's rates were slightly lower at 64%. The trend of increased adherence at older ages was also apparent in the nationwide data.

Discussion

Overall, Nashville residents' use of cancer screening tests are at or near the national goals. To keep the rates of screening tests at this level, the public health community must continue to promote awareness. The Tennessee Health Department's Breast and Cervical Cancer Early Detection Program is part of the CDC's national campaign to offer screening, education, and outreach to under-served women.⁴ The MPHDP Community Health Action Team works to promote breast cancer awareness and screening by offering breast self-exam education sessions. CDC and the U.S. Surgeon General have also initiated the Screen for Life Campaign to increase awareness about colorectal cancer and promote regular screening.⁵ Cancer screening tests are typically part of primary care, and should be obtained from a person's primary care physician. However, free tests are offered by some clinics and health care providers.

References:

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Overall, Nashville residents' use of cancer screening tests are at or near the national goals.

2.3 Health Care Systems

Adequacy of health care systems is an important determinant of health because it indicates the preparedness of hospitals and the medical community to deal with the growing demand for their services. In this report we will examine the health care systems in Nashville by looking at the number of hospital beds, hospital bed occupancy, emergency room visits, and the number of professional, licensed medical personnel.

Adequacy of health care systems is an important determinant of health.

Related Indicators

- Health care providers
- Lack of health insurance
- Health status and quality of life

2.3.1 Hospital Beds

Background

The number of hospital beds can be used as a measure of how prepared the community is to deal with the growing burden of chronic illness or outbreaks of communicable diseases. As the proportion of older adults in the population grows, so does the prevalence of chronic diseases. Some chronic diseases such as congestive heart failure result in more frequent hospitalizations, thus increasing the rate of hospital admissions and the demand for hospital beds.¹ As communities increase their preparedness for possible bioterrorism attacks, more attention is being given to the number of hospital beds available to care for large numbers of victims that need medical care simultaneously.

The number of hospital beds in the U.S. has been steadily shrinking since the mid 1980s.² Some researchers attribute this trend to a reduction in government subsidies and regulations for hospitals and the need for hospitals to save money.³ Fewer hospital beds can leave a community poorly prepared for higher admission rates and greater demand for Emergency Room (ER) care. This is exactly what is happening in the U.S. today. The American Hospital Association reports that hospital admissions have risen approximately 7% from 1994 to 2000.⁴ There are many explanations for the increased admissions, including recent changes in health insurance that allow more patients to stay overnight at the hospital and the fast growing numbers of older adults in the population.

The Tennessee Department of Health oversees the Joint Annual Survey of Hospitals. The survey contains information from all licensed hospitals in the state and includes the number of licensed and staffed beds, average daily census, and number of emergency room visits for the preceding year.⁵ The last year for which data is available is 2000. Using this information for Nashville hospitals, we considered Nashville's hospital bed availability and how it compares to Tennessee and the U.S.

Findings

Hospital Beds

There were 4,137 licensed and 3,424 staffed hospital beds in general medical and surgical hospitals in Nashville in the year 2000 (Table 15). The number of licensed beds per 1,000 population increased from 6.9 in 1999 to 7.3 in 2000. The number of staffed beds per 1,000 population also grew from 5.8 in 1999 to 6.0 in 2000. Figure 66 shows that Nashville has more licensed and staffed hospital beds per population than the other three metropolitan/urban counties in Tennessee (Shelby, Knox, and Hamilton). Nashville also has more beds per population than Tennessee (3.8 staffed beds per 1,000 population in 2000) and the U.S. (3.0 beds per 1,000 population in 2000⁴). Nashville is primarily an urban community, while Tennessee and the U.S. encompass both urban and rural areas.

Hospital Occupancy

The average daily census (or filled hospital beds) for Nashville hospitals was 2,455 in 2000. This was an 18% increase from 2,079 filled beds in 1999. Hospital occupancy (or filled beds per staffed beds) in Nashville was 72% in 2000, up from 69% in 1999. There has been a steady increase in hospital occupancy in Nashville over the last six years. There was a 19% increase from the 1995 rate (60%) to the 2000 rate (72%). In 2000, Nashville hospitals had higher occupancy than Knox and Hamilton Counties (Table 15), but lower occupancy

Data Sources

Tennessee Department of Health

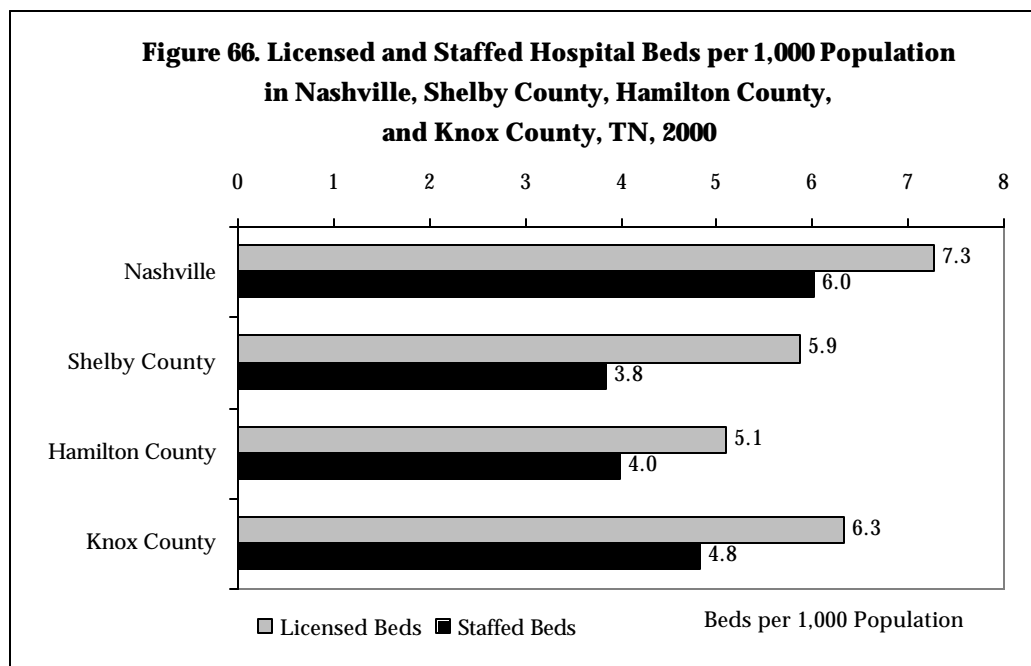
Table 15. Hospital Beds, Average Daily Census, and Occupancy in Nashville, Shelby County, Hamilton County, Knox County, and Tennessee, 1999 and 2000

Location	1999				2000			
	Licensed Beds	Staffed Beds	Average Daily Census	Hospital Occupancy*	Licensed Beds	Staffed Beds	Average Daily Census	Hospital Occupancy*
Nashville	3,631	3,067	2,079	69%	4,137	3,424	2,455	72%
Shelby County	4,982	3,277	2,349	72%	5,264	3,446	2,693	78%
Hamilton County	1,589	1,226	697	61%	1,570	1,225	725	59%
Knox County	2,420	1,765	1,124	64%	2,420	1,840	1,198	65%
Tennessee	23,388	17,931	10,240	58%	21,401	16,283	10,508	65%

*Hospital Occupancy is calculated from average daily census divided by the number of staffed beds.

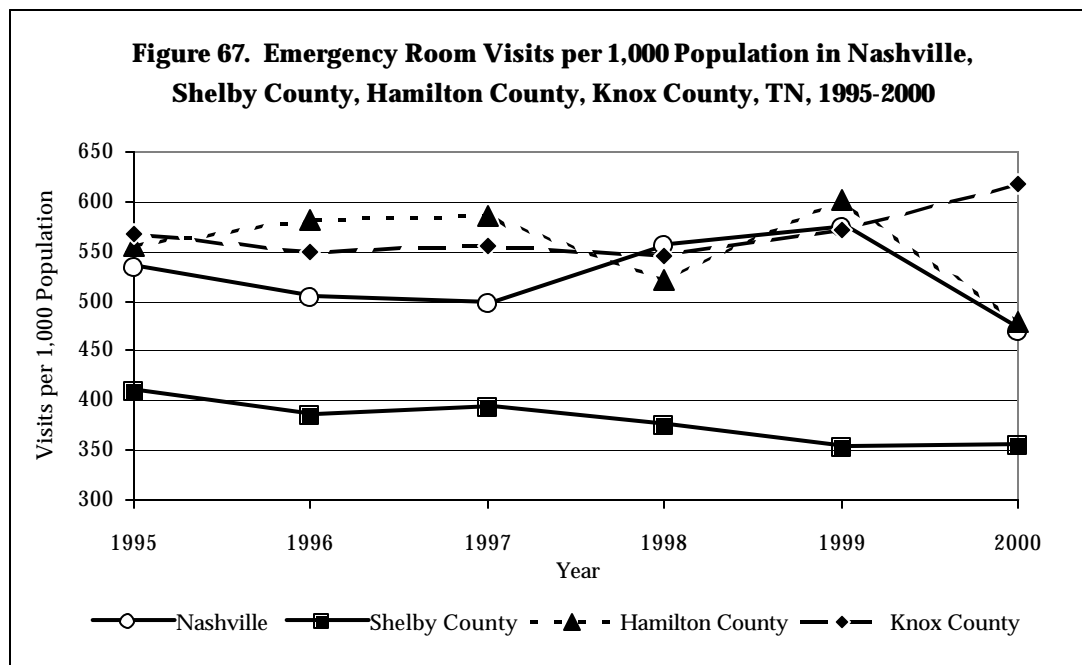
Data Source: Tennessee Department of Health.

than Shelby County hospitals. Nashville's occupancy rate was also higher than the Tennessee rate (65%) in 2000 and the U.S. rate (64%).



Emergency Room Visits

There were 267,274 emergency room visits in Nashville in 2000. The rate of visits per 1,000 population was 469, an 18% decrease from the 1999 rate of 573 per 1,000 population. Nashville's six-year trend (Figure 67) shows a decline in ER visits from 1995 to 1997, then an increase from 1997 to 1999. However, in 2000 we resumed a declining trend as the rate fell to a six-year low. The Hamilton County ER visit rate



(480 per 1,000 population) was approximately the same as Nashville's in 2000. The Knox County ER visit rate (617 per 1,000 population) was higher than Nashville's rate. Shelby County had much fewer ER visits per population (354 per 1,000 population) than Nashville in 2000.

Discussion

Nashville appears to be on its way to being prepared for higher numbers of hospital admissions. Nashville hospitals are staffing more beds, but with rising occupancy rates, even more beds may be necessary. Historically, hospitals have considered 85% occupancy to be optimal for providing adequate care to patients and producing sufficient revenue.³ But, this may not be true in all cases. The number of beds, staff, average length of stay, and influx of emergency and urgent patients all must be considered to decide what maximum occupancy is possible. One study showed that occupancy of 85% or higher might result in a delay of bed-assignment for as much as 15% of emergency patients.³ If patients can not be placed in an inpatient bed, they may remain in the ER longer and contribute to ER overcrowding. Insufficient hospital beds and ER overcrowding put the public at higher risk for poor medical outcomes due to delay in treatment, prolonged pain and suffering, and perhaps even avoidance of care.⁶ Therefore, it is in the best interest of public health for Nashville hospitals to maintain their current numbers of staffed beds and to increase them as necessary.

There were 4,137 licensed and 3,424 staffed hospital beds in general medical and surgical hospitals in Nashville in the year 2000.

References:

1. Kozak, LJ, Hall, MJ, Owings, MF. Trends in avoidable hospitalizations, 1980-1998. *Health Affairs*. 2001;20(2):225-32.
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The number of hospital beds can be used as a measure of how prepared the community is to deal with the growing burden of chronic illness or outbreaks of communicable diseases. As the proportion of older adults in the population grows, so does the prevalence of chronic diseases. As communities increase their preparedness for possible bioterrorism attacks, more attention is being given to the number of hospital beds available to care for large numbers of victims that need medical care simultaneously.

Related Indicators

- Hospital beds
- Lack of health insurance
- Health status and quality of life

2.3.2 Health Care Providers

Background

In addition to hospital beds, the number of licensed health care providers is also an important indicator of the readiness of our community to deal with both existing health care needs and new ones in the future. The number of medical professionals might also influence the trends in access to care for under-served populations in our community.¹ Despite the importance of ensuring that there are adequate medical professionals in a community, there are no absolute guidelines for determining the target numbers. The U.S. Health Resources and Services Administration, as well as other federal and non-federal organizations, have created estimates of the optimal physician per population ratios. These estimates provide some guidance, but could easily be misleading if any of several influencing factors change – the age composition of the population, the number of persons with health insurance, increased use of medical services by minorities, or changes in physicians' productivity. Also, the current national shortage of nurses and shortage of primary care physicians could diminish the pool of providers from which Nashville has to draw.

For this report, we obtained the numbers of licensed medical professionals (nurses, physicians, and physician assistants) in Nashville for 2001 from the Tennessee Department of Health. The most recent year for which state-wide and nation-wide data available is 1999.

Findings

Physicians

There were 2,789 licensed medical doctors (MDs) and doctors of osteopathy (DOs) in Nashville in 2001. The physician to population ratio was 1 to 204, or 4.9 licensed physicians per 1,000 population. Nashville has a more favorable physician-to-population ratio than both Tennessee and the U.S. – in 1999, the U.S. ratio was 1 to 355 and the ratio in Tennessee was 1 to 437.

Physicians in the fields of internal medicine, family practice, and general practice typically provide primary care services. Nashville had 677 primary care physicians in 2001, with a physician to population ratio of 1 to 842. Nashville also had 106 licensed emergency medicine physicians in 2001, for a physician to population ratio of 1 to 5,377 or 19 per 1,000 population. (Table 16.)

Nurses and Physician Assistants

There were 2,499 licensed practical nurses (LPNs), 10,277 registered nurses (RNs) including nurse practitioners, and 84 physician assistants (PAs) in Nashville in 2001, for a total of 12,860 mid-level medical care providers. There were 4.6 nurses or PAs for each doctor in Nashville and one nurse or PA for every 44 county residents.

Data Sources

Tennessee Department of Health

Table 16. Licensed Health Care Providers in Nashville 2001, Tennessee 1999, and U.S., 1999

Profession	Nashville, 2001			Tennessee, 1999			U.S., 1999		
	Number	Provider to Population Ratio	Providers per 1,000 Population	Number	Provider to Population Ratio	Providers per 1,000 Population	Number	Provider to Population Ratio	Providers per 1,000 Population
Licensed Practical Nurses (LPN)	2,499			21,980			^		
Registered Nurses (RN)*	10,277			52,505			^		
LPN and RN	12,776	44.6	22.4	74,485	73.6	13.6	2,205,440	123.7	8.1
Physician Assistants (PA)	84			^			^		
LPN, RN, PA	12,860	44.3	22.6	^			^		
Doctors of Osteopathy (DO)	18			^			^		
Medical Doctors (MD)	2,771			^			^		
MD and OD	2,789	204.4	4.9	12,550	437.0	2.3	767,592	355.0	2.8
MD - Emergency Medicine	106	5377.2	0.2	^			^		
MD - Internal Medicine (IM)	540			^			^		
MD - Family Practice (FP)	101		0.2	^			^		
MD - General Practice (GP)	36		0.1	^			^		
MD - IM, FP, GP	677	841.9	1.2	^			^		

*Registered nurses includes nurse practitioners.

^ Data not available.

Discussion

Nashville is fortunate to have a large number of health care providers to serve its population; however, we cannot expect that this trend will continue. The shortage of nurses continues to be a nation-wide crisis that is getting attention on the federal level. The U.S. House of Representatives is considering the Nursing Employment and Educational Development Act to address nurse recruitment and offer incentives to nurses.³ In January 2002, California passed a law to mandate the nurse to patient ratio, and became the first state to legally address the nursing crisis and its implication for quality of care. Primary care physician shortages are also a growing problem. A study using the recently revised version of the physician supply trend model found that by the year 2020, the U.S. will have a deficit of 200,000 physicians.⁴ Perhaps, because Nashville has two local medical schools, we may not be as harshly impacted by the coming physician shortage, but the public health community must be mindful of the potential for it to occur.

References:

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Nashville is fortunate to have a large number of health care providers to serve its population. There were 2,789 licensed medical doctors (MDs) and doctors of osteopathy (DOs) in Nashville in 2001. Nashville had a more favorable physician-to-population ratio than both Tennessee and the U.S. In 1999, the U.S. ratio was 1 to 355 and the ratio in Tennessee was 1 to 437.